



GRADE 1 MATH: FUN IN THE SNOW WITH MAX AND RUBY

UNIT OVERVIEW

This 4-5 week unit is designed to introduce students to the operations of addition and subtraction, and to provide students the opportunity to apply these operations. Throughout the unit, students will model by counting all or taking away, and counting on. Guided practice with these methods will lead to growth in Grade 1 and fluency and precision in Grade 2.

TASK DETAILS

Task Name: Fun in the Snow with Max and Ruby

Grade: 1

Subject: Mathematics

Depth of Knowledge: 2 -3

Task Description: This task includes the recall of facts in one-step operation problems within twenty and requires students to make some decisions on how to approach the problem using basic addition and subtraction skills. It demands reasoning abilities, and students must apply their understanding of operations to solve a problem presented in a novel and unrehearsed way.

Standards:

1.OA.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

1.OA.4 Understand subtraction as an unknown-addend problem. For example, subtract $10 - 8$ by finding the number that makes 10 when added to 8. Add and subtract within 20.

1.OA.5 Relate counting to addition and subtraction.

1.OA.6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$); decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$); using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$, one knows $12 - 8 = 4$); and creating equivalent but easier or known sums.

Standards for Mathematical Practice:

MP.1 Make sense of problems and persevere in solving them.

MP.2 Reason abstractly and quantitatively.

MP.3 Construct viable arguments and critique the reasoning of others.

MP.4 Model with mathematics.

MP.6 Attend to precision.

MP.7 Look for and make use of structure.



TABLE OF CONTENTS

The task and instructional supports in the following pages are designed to help educators understand and implement Common Core–aligned tasks that are embedded in a unit of instruction. We have learned through our pilot work that focusing instruction on units anchored in rigorous Common Core–aligned assessments drives significant shifts in curriculum and pedagogy. Callout boxes and Universal Design for Learning (UDL) support are included to provide multiple entry points for diverse learners.

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Acknowledgements: This unit outline was developed by the following educators at PS 68: Barbara Tully, NYCDOE Math Common Core Fellow; Cathy Helfrich, Principal; Ndidiyama Aguoji, Elementary Teacher; Julia Goldstein, Early Childhood Special Education Teacher and Jessica La Bella, Early Childhood Special Education Teacher. Input provided by Jeneca Parker, NYCDOE Math Common Core Fellow and Cynthia Gehan, NYCDOE Math Common Core Fellow.



GRADE 1 MATH: FUN IN THE SNOW WITH MAX AND RUBY

PERFORMANCE TASK



1. Max and Ruby are playing in the snow. Together they make 9 snowballs. Write 10 number sentences to show all the ways to make 9.

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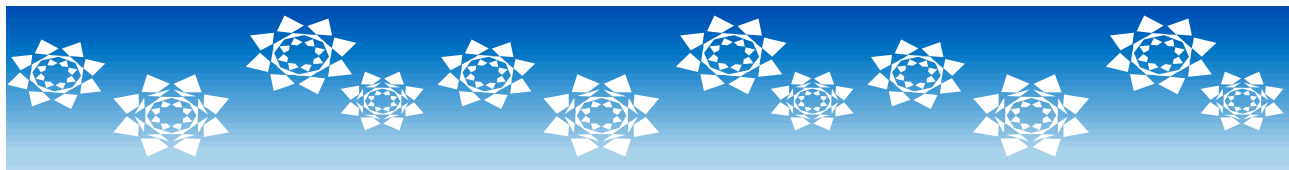
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$$\underline{\hspace{2cm}} \bigcirc \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$



2. The next day Max made more snowballs. He now has 15 snowballs. Ruby has 9 snowballs. How many more snowballs does Max have than Ruby?

Complete the model to show your answer:

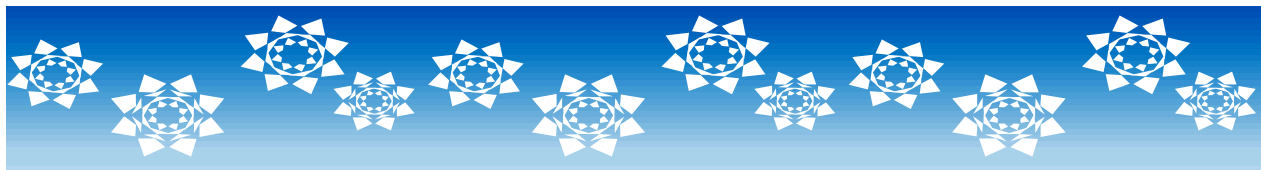
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Write a subtraction sentence about the story:

_____ ○ _____ = _____

Write an addition sentence about the story:

_____ ○ _____ = _____

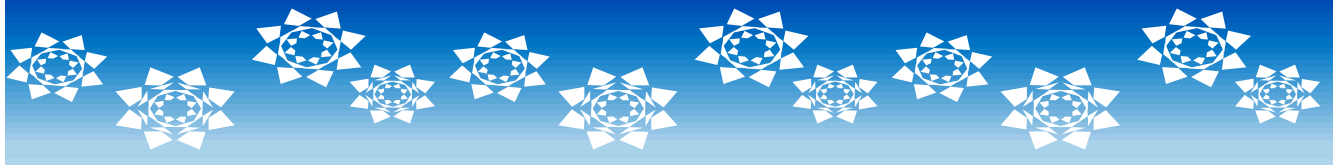


3. Max had 15 snowballs. Some melted. Now he only has 11. Write a subtraction sentence to see how many melted:

$$\underline{\hspace{2cm}} \bigcirc \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$

Ruby thinks that subtraction is the only way to show how many melted. Show an addition sentence to prove her wrong:

$$\underline{\hspace{2cm}} \bigcirc \underline{\hspace{2cm}} = \underline{\hspace{2cm}}$$



4. There are 18 buttons for Max and Ruby to use on their snowmen. Max uses 8 buttons. Ruby uses 6 buttons. How many buttons are left over?

Use pictures or numbers to prove your answer:

Explain your thinking:



GRADE 1 MATH: FUN IN THE SNOW WITH MAX AND RUBY

RUBRIC

The rubric section contains a scoring guide and performance level descriptions for the *Fun in the Snow with Max and Ruby* task.

Scoring Guide: The scoring guide is designed specifically for the culminating performance task. The points highlight each specific piece of student thinking and explanation required by the task and help teachers see common misconceptions. The scoring guide can then be used to refer back to the performance level descriptions.

Performance Level Descriptions: Performance level descriptions help teachers think about the overall qualities of work for the task by providing information about the expected level of performance for students. Performance level descriptions provide score ranges for each level, which are assessed using the scoring guide.

Max and Ruby's Scoring Guide
Performance Assessment Rubric Grade 1

	Fun in the Snow with Max and Ruby	Points	Maximum Section Points
<p>The core elements of the performance required by this task are:</p> <ul style="list-style-type: none"> • Demonstrate fluency for addition and subtraction within 10. • Add and subtract within 20 to solve word problems. • Use strategies to add and subtract within 20, such as implementing the relationship between addition and subtraction and creating equivalent but easier or known sums. • Communicate reasoning using numbers or pictures. <p>Based on these specific aspects of performance, credit should be assigned as follows:</p>			
1.	<p>Correct answers are: 0+9, 1+8, 2+7, 3+6, 4+5, 5+4, 6+3, 7+2, 8+1, 9+0</p> <p>If you get 9-10 correct</p> <p>Or</p> <p>If you get 6-8 Correct</p>	<p>2</p> <p>1</p>	2
2.	<p>Shows the correct model demonstrating the unknown.</p> <p>Shows correct subtraction equation ($15-9=6$) AND correct addition equation ($9+6=15$ or $6+9=15$)</p>	<p>1</p> <p>1</p>	2
3.	<p>Shows correct subtraction equation ($15-11=4$ or $15-4=11$)</p> <p>Shows correct addition equation ($4+11=15$ or $11+4=15$)</p>	<p>1</p> <p>1</p>	2
4.	<p>Uses pictures or numbers to demonstrate the correct answer (4 is left over). Strategies will vary.</p> <p>Explanation that demonstrates the strategy used to come up with the correct answer of 4.</p>	<p>1</p> <p>1</p>	2
	Total Points:		8

Grade 1 Math: Fun in the Snow with Max and Ruby

Performance Level Descriptors

Performance Level Descriptions and Scores

Performance is reported at four levels: 1 through 4, with 4 as the highest.

Level 1: Demonstrates Minimal Success (0-2 points)

The student's response shows *few of the elements* of performance that the tasks demand as defined by the Common Core standards. The work shows a minimal attempt at the problem. Communication is limited and shows minimal reasoning. The student's response rarely uses definitions in the explanations. The student struggles to recognize patterns or the structure of the problem situation.

Level 2: Performance Approaching Standard (3-4 points)

The student's response shows *some of the elements* of performance that the tasks demand and some signs of a coherent attack on the core of some of the problems as defined by the Common Core standards. However, the shortcomings are substantial, and the evidence suggests that the student would not be able to produce high-quality solutions without significant further instruction. The student might ignore or fail to address some of the constraints of the problem. The student may occasionally make sense of quantities in relationships in the problem, but the use of quantity is limited or not fully developed. The student response may not state assumptions, definitions, and previously established results. While the student makes an attack on the problem, it is incomplete. The student may recognize some patterns or structures, but has trouble generalizing or using them to solve the problem.

Level 3: Performance At Standard (5-6 points)

For most of the task, the student's response shows the *major elements* of performance that the tasks demand as defined by the Common Core standards, and is organized as a coherent attack on the core of the problem. There are errors or omissions, some of which may be important, but of a kind that the student could well fix with more time for checking and revision and some limited help. The student explains the problem and identifies constraints. The student makes sense of quantities and their relationships in the problem situations. S/he often uses abstractions to represent a problem symbolically or with other mathematical representations. The student response may use assumptions, definitions, and previously established results in constructing arguments. S/he may make conjectures and build a logical progression of statements to explore the truth of the conjectures. The student might discern patterns or structures and make connections between representations

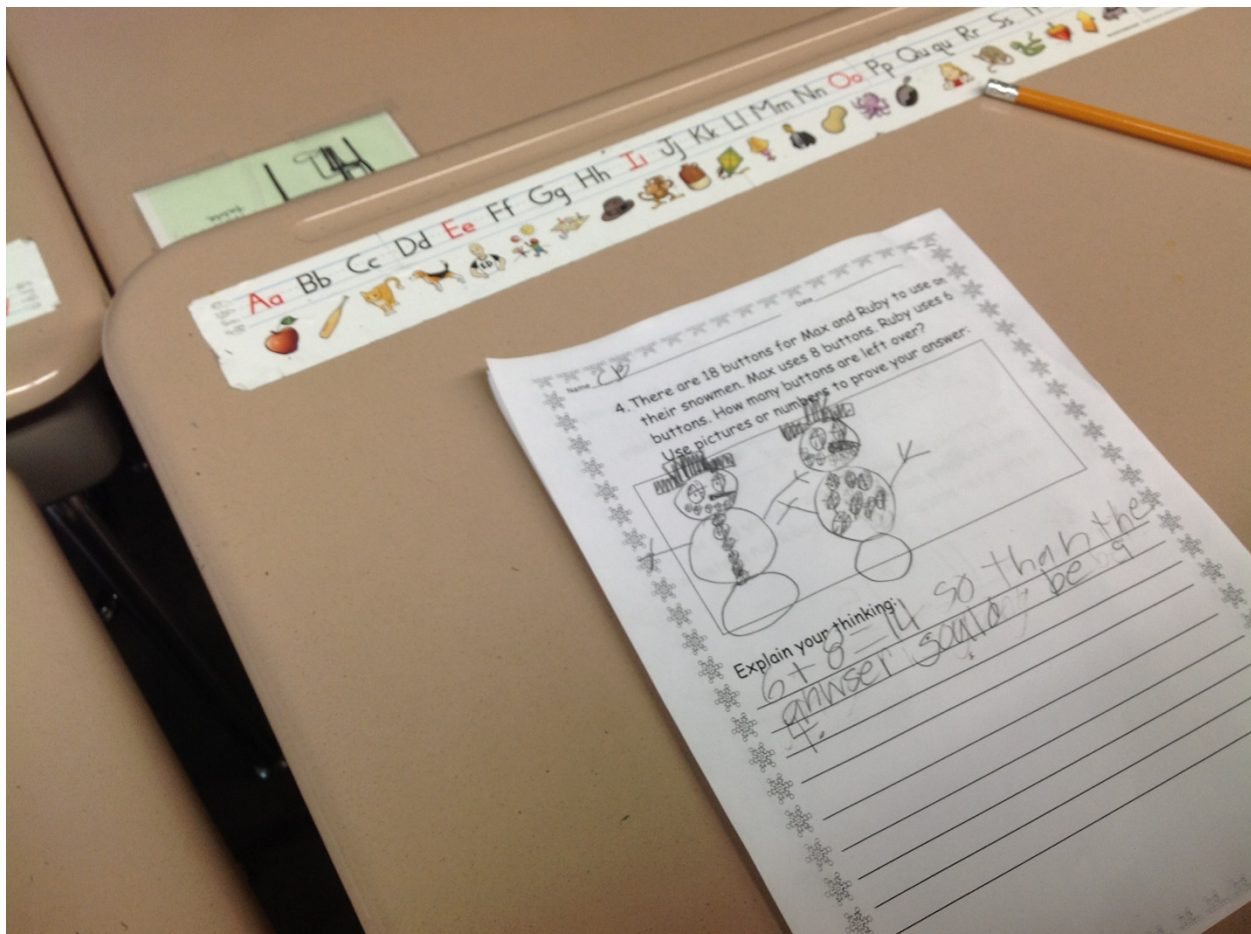
Level 4: Achieves Standards at a High Level (7-8 points)

The student's response *masters* the demands of nearly all of the tasks as defined by the Common Core standards, with little or no errors. With more time for checking and revision, excellent solutions would seem likely. The student response shows understanding and use of stated assumptions, definitions, and previously established results in constructing arguments. The student is able to make conjectures and build a logical progression of statements to explore the truth of the conjecture. The student response routinely interprets the mathematical results in the context of the situation and reflects on whether the results make sense. The communication is precise, using definitions clearly. The student looks closely to discern a pattern or structure. The body of work addresses the overall situation of the problem and process, while attending to the detail.



GRADE 1 MATH: FUN IN THE SNOW WITH MAX AND RUBY ANNOTATED STUDENT WORK

This section contains annotated student work at a range of score points and implications for instruction for each performance level. The student work and annotations are intended to support teachers, showing examples of student understandings and misunderstandings of the task. The annotated student work and implications for instruction can be used to support students in moving to the next performance level.



Level 4: Achieves Standards at a High Level (Score Range 7–8)

The student's response *masters* the demands of nearly all of the tasks as defined by the Common Core standards, with little or no errors. With more time for checking and revision, excellent solutions would seem likely. The student response shows understanding and use of stated assumptions, definitions, and previously established results in constructing arguments. The student is able to make conjectures and build a logical progression of statements to explore the truth of the conjectures. The student routinely interprets the mathematical results in the context of the situation and reflects on whether the results make sense. The communication is precise, using definitions clearly. The student looks closely to discern a pattern or structure. The body of work addresses the overall situation of the problem and process, while attending to the detail.

Student A – Level 4 (Score 8)

1. Max and Ruby are playing in the snow. Together they make 9 snowballs. Write 10 number sentences to show all the ways to make 9.

4	+	5	=	9
8	+	1	=	9
7	+	2	=	9
6	+	3	=	9
9	+	0	=	9
5	+	4	=	9
1	+	8	=	9
2	+	7	=	9
3	+	6	=	9
0	+	9	=	9

1

The student demonstrates fluency in adding within 10. Clearly understands the word problem and computes accurately. All responses are accurate.

1. OA.1, 1.OA.6

MP.2, MP.6, MP.7

Grade 1 Math: Fun in the Snow
Annotated Student Work: Level 4

2. The next day Max made more snowballs. He now has 15 snowballs. Ruby has 9 snowballs. How many more snowballs does Max have than Ruby?

Complete the model to show the story:

15	
000 000 000	?

Student uses the strategy of holding the place of the unknown with a question mark.

The student demonstrates understanding of solving a word problem with an unknown addend.

1. OA.1, 1.OA.4, 1.OA.5,

MP.1, MP.2, MP.4 & MP.6

Write a subtraction sentence to solve the story:

$$15 - 9 = 6$$

Write an addition sentence to solve the story:

$$9 + 6 = 15$$

The student writes a correct subtraction and addition sentence to solve the problem. All numbers are in the correct place based on the situation. Minus and addition signs are also correctly labeled.

1. OA.5, MP.2

3. Max had 15 snowballs. Some melted. Now he only has 11.

Write a subtraction sentence to see how many melted:

$$15 - 11 = 4$$

Ruby thinks that subtraction is the only way to show how many melted. Show an addition sentence to prove her wrong:

$$4 + 11 = 15$$

Student indicates knowledge of the quantities posed in the situation. Student reasons quantitatively understanding that 15 represents the total quantity, and 11 represents a part.

1. OA.1, 1.OA.4

MP.1, MP.2

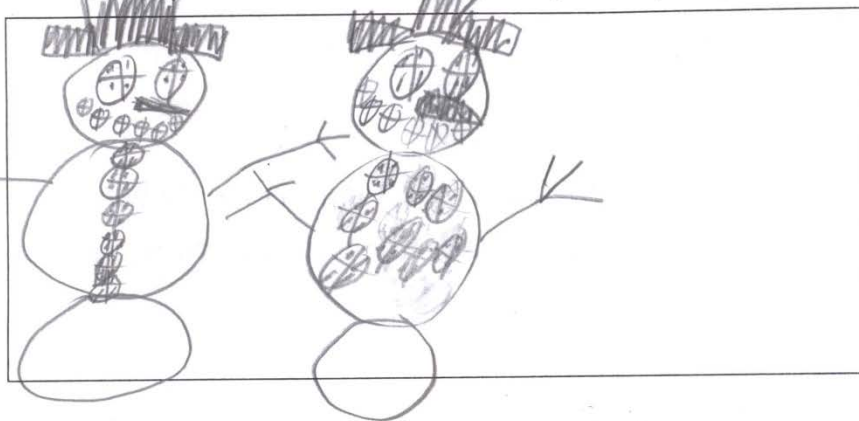
Student is able to correctly write an addition sentence based on the subtraction problem above.

1. OA.1, 1.OA.5

MP.1, MP.2

4. There are 18 buttons for Max and Ruby to use on their snowmen. Max uses 8 buttons. Ruby uses 6 buttons. How many buttons are left over?

Use pictures or numbers to prove your answer:



Student demonstrates the ability to add correctly and indicates that the strategy "add on" was utilized.

1. OA.1, 1.OA.6

MP.2, MP.4,
MP.6

The student indicates knowledge of quantities by correctly drawing 8 buttons on the first snowman and 6 buttons on the second snowman.

1. OA.1

MP.2, MP.6

Explain your thinking:

$6 + 8 = 14$ so that the answer could be a 4. I know that's the answer because I counted up I counted up 14 to 18.

Student provides a clear explanation.

1. OA.1

MP.1, MP.3, MP.6

Implications/Next steps: The student demonstrates strong understanding of the work in the targeted standards and practices. In order to take this student to a higher level with explanations, provide additional opportunities for the student to verbalize thoughts and have the student read aloud his written response to see if it makes sense.

Student B – Level 4 (Score 8)

1. Max and Ruby are playing in the snow. Together they make 9 snowballs. Write 10 number sentences to show all the ways to make 9.

$$\begin{array}{rclcl} 7 & + & 2 & = & 9 \\ 8 & + & 1 & = & 9 \\ 6 & + & 3 & = & 9 \\ 5 & + & 4 & = & 9 \\ 9 & + & 0 & = & 9 \\ 3 & + & 6 & = & 9 \\ 2 & + & 7 & = & 9 \\ 1 & + & 8 & = & 9 \\ 0 & + & 9 & = & 9 \\ 4 & + & 5 & = & 9 \end{array}$$

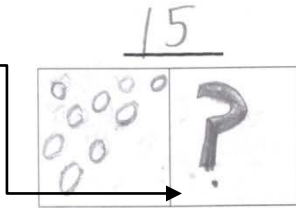
Student demonstrates fluency in adding within 10. Clearly understands the word problem and computes accurately. All responses are accurate.

1. OA.1, 1.OA.6

MP.2, MP.6, MP.7

2. The next day Max made more snowballs. He now has 15 snowballs. Ruby has 9 snowballs. How many more snowballs does Max have than Ruby?
Complete the model to show the story:

Student uses the strategy of holding the place of the unknown with a question mark.



Student demonstrates understanding of solving a word problem with an unknown addend. 1. OA.1, 1.OA.4, 1.OA.5

MP.1, MP.2, MP.4
MP.6

Write a subtraction sentence to solve the story:

$$15 - 9 = 6$$

Write an addition sentence to solve the story:

$$9 + 6 = 15$$

Student writes a correct subtraction and addition sentence to solve the problem. All numbers are in the correct place based on the situation. Minus and plus signs are placed correctly.

1. OA.2, 1.OA.5

MP.1, MP.2, MP.4,
MP.6

Grade 1 Math: Fun in the Snow
Annotated Student Work: Level 4

Name _____

Date _____

3. Max had 15 snowballs. Some melted. Now he only has 11.

Write a subtraction sentence to see how many melted:

$$15 - 11 = 4$$

Ruby thinks that subtraction is the only way to show how many melted. Show an addition sentence to prove her wrong:

$$11 + 4 = 15$$

Student indicates knowledge of the quantities posed in the situation. Student reasons quantitatively understanding that 15 represents the total quantity and 11 represents a part.

1. OA.1, 1.OA.4

MP.1, MP.2

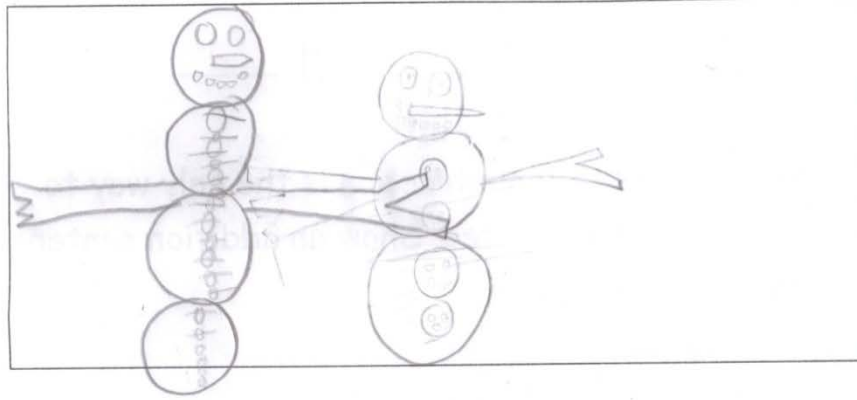
Student is able to correctly write an addition sentence based on the subtraction problem above.

OA.1, 1.OA.5

MP.1, MP.2

4. There are 18 buttons for Max and Ruby to use on their snowmen. Max uses 8 buttons. Ruby uses 6 buttons. How many buttons are left over?

Use pictures or numbers to prove your answer:



Explain your thinking:

The snowman had 18 buttons max uses 8
Ruby uses 6 there are 4 left.

The student clearly explains that he subtracted first 8 and then 6 from 18 leaving 4 left over.

In addition, one can infer from the illustration that the student drew 18 buttons and then took away 8 and then 6.

Mathematically proficient students can communicate their thinking in multiple ways, such as words and illustrations.

1.OA.1, 1.OA.6
MP.1, MP.2, MP.4,
MP.5, MP.6

Implications/Next steps: The student clearly demonstrates knowledge of the standards and practices imbedded in this task. In future activities, guide this student to use mathematical vocabulary (e.g. "counting on") in justifying his answers.

Student C – Level 4 (Score 7)

Student demonstrates fluency in adding within 10. Clearly understands the word problem and computes accurately. All responses are accurate.

1. OA.1, 1.OA.6

MP.2, MP.6, MP.7

1. Max and Ruby are playing in the snow. Together they make 9 snowballs. Write 10 number sentences to show all the ways to make 9.

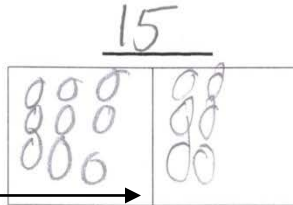
$$\begin{array}{rcl} 8 & + & 1 = 9 \\ 7 & + & 2 = 9 \\ 6 & + & 3 = 9 \\ 5 & + & 4 = 9 \\ 4 & + & 5 = 9 \\ 3 & + & 6 = 9 \\ 2 & + & 7 = 9 \\ 1 & + & 8 = 9 \\ 0 & + & 9 = 9 \\ 9 & + & 0 = 9 \end{array}$$

2. The next day Max made more snowballs. He now has 15 snowballs. Ruby has 9 snowballs. How many more snowballs does Max have than Ruby?

Complete the model to show the story:

Student solves and represents the unknown with an illustration of snowballs.

1.OA.1



Student indicates knowledge of facts. However, he uses his solution instead of quantities given in the problem.

1.OA.1, 1.OA.4,
1.OA.5

MP. 1, MP.4

This indicates additional support is needed with MP.2.

Write a subtraction sentence to solve the story:

$$15 - 6 = 9$$

Write an addition sentence to solve the story:

$$9 + 6 = 15$$

Grade 1 Math: Fun in the Snow
Annotated Student Work: Level 4

Name _____

3. Max had 15 snowballs. Some melted. Now he only has 11.

Write a subtraction sentence to see how many melted:

$$15 - 11 = 4$$

Ruby thinks that subtraction is the only way to show how many melted. Show an addition sentence to prove her wrong:

$$4 + 11 = 15$$

Student indicates knowledge of the quantities posed in the situation. Student reasons quantitatively, understanding that the number 15 represents the total quantity and 11 represents a part.

1. OA.1, 1.OA.4

MP.1, MP.2

Student is able to correctly write an addition sentence based on the subtraction problem above.

1.OA.1, 1.OA.5

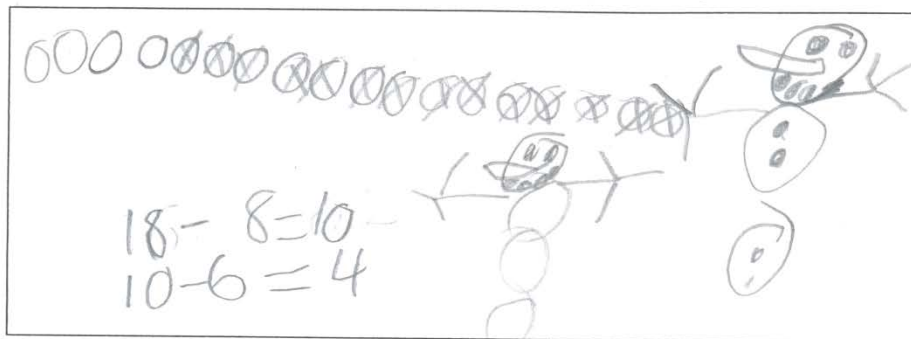
MP.1, MP.2

Grade 1 Math: Fun in the Snow
Annotated Student Work: Level 4

Name C. L.

Date 5-31-12

4. There are 18 buttons for Max and Ruby to use on their snowmen. Max uses 8 buttons. Ruby uses 6 buttons. How many buttons are left over?
Use pictures or numbers to prove your answer:



Student shows evidence of understanding of subtraction strategies and uses numerical representations to augment his illustration.

1.OA.1, 1.OA.6

MP.2, MP.4, MP.6

Student gives a complete and clear explanation.

1. OA.1, 1.OA.6

MP.1, MP.2, MP.3,
MP.4, MP.5

Explain your thinking:

There are 4 buttons left. They have 18 before. Max uses 8. Ruby uses 6. Max use more buttons than Ruby. The leftover answer is 4. How I did it is I drew 18 buttons. Then I took away 8 and got 10. Then I took away 6 buttons and got 4.

4

Implications/Next steps: This student received a score of 7 due to his response in question 2. It is evident that this student has a good command of most of the practices and standards embedded in this task. In order to support this student, more support is needed in MP.2, helping the student attend to the referents for numbers and attend to meaning of quantities.

Level 3: Performance Approaching Standard (Score Range 5–6)

For most of the task, the student's response shows the *major elements* of performance that the tasks demand as defined by the Common Core standards, and is organized as a coherent attack on the core of the problem. There are errors or omissions, some of which may be important, but of a kind that the student could well fix with more time for checking and revision and limited help. The student explains the problem and identifies constraints. The student makes sense of quantities and their relationships in the problem situations. S/he often uses abstractions to represent a problem symbolically or with other mathematical representations. The student response may use assumptions, definitions, and previously established results in constructing arguments. S/he may make conjectures and build a logical progression of statements to explore the truth of the conjectures. The student might discern patterns or structures and make connections between representations

Student D – Level 3 (Score 6)

1. Max and Ruby are playing in the snow. Together they make 9 snowballs. Write 10 number sentences to show all the ways to make 9.

7	+	2	=	9
8	+	1	=	9
6	+	4	=	9
4	+	6	=	9
4	+	5	=	9
5	+	4	=	9
9	+	0	=	9
1	+	8	=	9
2	+	7	=	9
3	+	6	=	9

1

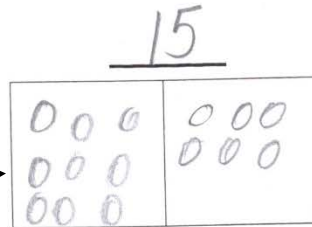
Student has a total of eight facts correct. Student incorrectly states that $6+4=9$ and the inverse $4+6=9$. He is not aware of the error even when he correctly writes $6+3=9$ and $3+6=9$.

1. OA.1

1. OA.6 needs additional support

MP.6, MP.7 both need additional support

2. The next day Max made more snowballs. He now has 15 snowballs. Ruby has 9 snowballs. How many more snowballs does Max have than Ruby?
Complete the model to show the story:



Student solves and represents the unknown with an illustration of snowballs.

1.OA.1

Write a subtraction sentence to solve the story:

$$15 - 6 = 9$$

Write an addition sentence to solve the story:

$$9 + 6 = 15$$

Student indicates knowledge of facts. However, he uses his solution instead of quantities given in the problem.

1.OA.1, 1.OA.4,
1.OA.5

MP.1, MP.4

This indicates additional support is needed with MP.2.

3. Max had 15 snowballs. Some melted. Now he only has 11.

Write a subtraction sentence to see how many melted:

$$15 - 4 = 11$$

Student shows knowledge of facts. The numbers of the equation follow the sequence of the problem.

1.OA.1, 1.OA.4
MP.1, MP.2

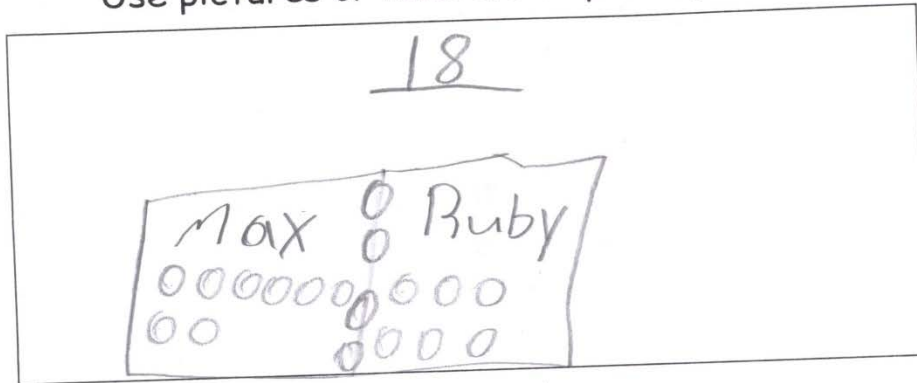
Ruby thinks that subtraction is the only way to show how many melted. Show an addition sentence to prove her wrong:

$$11 + 4 = 15$$

Student is able to correctly write an addition sentence based on the subtraction problem above.

1.OA.5

4. There are 18 buttons for Max and Ruby to use on their snowmen. Max uses 8 buttons. Ruby uses 6 buttons. How many buttons are left over?
Use pictures or numbers to prove your answer:



Explain your thinking:

I counted 18 I took away 8 and 6 and I got 4. there were 18 buttons I counted back 8 then I counted back 6 to get 4 left over.



This student demonstrates proficiency in numerous ways. His explanation first states that he “took away”. He then restates his statement, indicating that he “counted back” making the connection between “took away” and “counted back”. There is also an illustration at the bottom of the page indicating these strategies, as well as the illustration in the box to indicate the two parts and leftover placed in the middle.

1.OA.1, 1.OA.6

MP.1, MP.2, MP.3, MP.4, MP.5

Implications/Next Steps: This student indicates knowledge of most of the standards and the practices. The student needs additional practice with fluency in facts to 10. In order to support this student in MP.6 and MP.7, provide additional guidance in self-checking strategies.

Student E – Level 3 (Score 5)

1. Max and Ruby are playing in the snow. Together they make 9 snowballs. Write 10 number sentences to show all the ways to make 9.

$$8 + 1 = 9$$

$$5 + 4 = 9$$

$$7 + 2 = 9$$

$$9 + 0 = 9$$

$$6 + 3 = 9$$

$$3 + 6 = 9$$

$$6 + 3 = 9$$

$$4 + 5 = 9$$

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

$$\underline{\hspace{1cm}} + \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$$

Student has a total of seven facts correct, earning him one point.

Although student correctly writes the facts he has recalled, he does not recall all the combinations to make 9. In addition $6+3=9$ is repeated.

1. OA.1

1. OA.6 needs additional support

M.P.6, MP.7 both need additional support

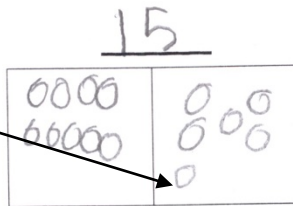
Grade 1 Math: Fun in the Snow
Annotated Student Work: Level 3

Name _____

Date _____

2. The next day Max made more snowballs. He now has 15 snowballs. Ruby has 9 snowballs. How many more snowballs does Max have than Ruby?

Complete the model to show the story:



Student solves and represents the unknown with an illustration of snowballs.

1.OA.1

Write a subtraction sentence to solve the story:

$$15 - 9 = 6$$

Write an addition sentence to solve the story:

$$6 + 9 = 6$$

Student recognizes that $15 - 9 = 6$ but is unable to make the connection between addition and subtraction.

Knowledge of 1.OA.4 and 1.OA.5 are lacking.

The addition sentence shows the student has not made sense of the problem, and the answer is incorrect. MP.1, MP.6

3. Max had 15 snowballs. Some melted. Now he only has 11.

Write a subtraction sentence to see how many melted:

$$15 - 11 = 4$$

Ruby thinks that subtraction is the only way to show how many melted. Show an addition sentence to prove her wrong:

$$11 + 4 = 15$$

Student indicates knowledge of the quantities posed in the situation. Student reasons quantitatively understanding that 15 represents the total quantity, and 11 represents a part.

1.OA.1, 1.OA.4

MP.1, MP.2

Student is able to correctly write an addition sentence based on the subtraction problem above, indicating an understanding of the relationship between addition and subtraction.

1. OA.1, 1.OA.5

MP.1, MP.2

4. There are 18 buttons for Max and Ruby to use on their snowmen. Max uses 8 buttons. Ruby uses 6 buttons. How many buttons are left over?
Use pictures or numbers to prove your answer:



Explain your thinking:

I draw 18 snow buttons
you need to take away
6 that equals 11

The student initially identifies some of the quantities of the problem and chooses the correct operation, but he does not persevere in making sense of the problem.
MP.1

1.OA.1 & 1.OA.6 are lacking in this work.

The student draws 18 snowballs and shows an attempt to subtract two quantities from 18 and have some snowballs left over.

Implications/Next steps: This student does not demonstrate mathematical proficiency. As indicated in the annotations of question 1, the student needs additional support in organizing his work. The student needs to develop strategies for inquiring whether his work makes sense (question 2). In addition, more work is needed to build fluency with facts to realize when a solution is not accurate.

Level 2: Performance Below Standard (Score Range 3–4)

The student's response shows *some of the elements* of performance that the tasks demand and some signs of a coherent attack on the core of some of the problems as defined by the Common Core standards. However, the shortcomings are substantial, and the evidence suggests that the student would not be able to produce high-quality solutions without significant further instruction. The student might ignore or fail to address some of the constraints of the problem. The student may occasionally make sense of quantities in relationships in the problem, but the use of quantity is limited or not fully developed. The student response may not state assumptions, definitions, and previously established results. While the student makes an attack on the problem, it is incomplete. The student may recognize some patterns or structures, but has trouble generalizing or using them to solve the problem.

Student F – Level 2 (Score 4)

Student correctly writes the number sentences for 8 combinations. Student does not persevere in solving all possible combinations.

1.OA.1

1.OA.6 needs additional support.

MP.2, MP.6, MP.7 all demonstrate a weak understanding and need more support.

1. Max and Ruby are playing in the snow. Together they make 9 snowballs. Write 10 number sentences to show all the ways to make 9.

$$\begin{array}{rcl} 8 & + & 1 = 9 \\ 9 & + & 0 = 9 \\ 7 & + & 2 = 9 \\ 6 & + & 3 = 9 \\ 1 & + & 8 = 9 \\ 2 & + & 7 = 9 \\ 5 & + & 4 = 9 \\ 4 & + & 5 = 9 \\ 3 & + & \quad = 9 \\ \quad & + & \quad = 9 \end{array}$$

Grade 1 Math: Fun in the Snow
Annotated Student Work: Level 2

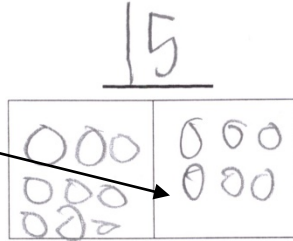
Name _____

Date _____

2. The next day Max made more snowballs. He now has 15 snowballs. Ruby has 9 snowballs. How many more snowballs does Max have than Ruby?
Complete the model to show the story:

Student solves and represents the unknown with an illustration of snowballs.

1.OA.1



Write a subtraction sentence to solve the story:

$$15 - 9 = 6$$

Write an addition sentence to solve the story:

$$6 + 9 = 15$$

The student is unable to make the connection between addition and subtraction.

The addition sentence shows the student has not made sense of the problem and the answer is incorrect. MP.1, MP.6

Grade 1 Math: Fun in the Snow
Annotated Student Work: Level 2

Name _____

Date _____

3. Max had 15 snowballs. Some melted. Now he only has 11.

Write a subtraction sentence to see how many melted:

$$15 - 4 = 11$$

Ruby thinks that subtraction is the only way to show how many melted. Show an addition sentence to prove her wrong:

$$11 + 4 = 15$$

Student indicates knowledge of the quantities posed in the situation. Student reasons quantitatively understanding that 15 represents the total quantity, and 11 represents a part.

1.OA.1, 1.OA.4

MP.1, MP.2

Grade 1 Math: Fun in the Snow
Annotated Student Work: Level 2

Name _____

Date _____

4. There are 18 buttons for Max and Ruby to use on their snowmen. Max uses 8 buttons. Ruby uses 6 buttons. How many buttons are left over?
Use pictures or numbers to prove your answer:



Explain your thinking:

There are 4 buttons left because
 $18 - 8 = 10$ $10 - 6 = 4$ so $4 - 6 = 4$.

In the illustration, the correct number of buttons is shown for each snowman but not for the leftover.

Student makes an attempt to explain how he got the leftover of 4, but the work demonstrates a lack of understanding of how to use symbols when representing quantities. MP.6

Student exhibits a weak understanding of 1.OA.1, 1.OA.6, MP.2, MP.3, MP.4, and MP.5

Student does make sense of the problem and arrive at the correct answer. MP.1

4

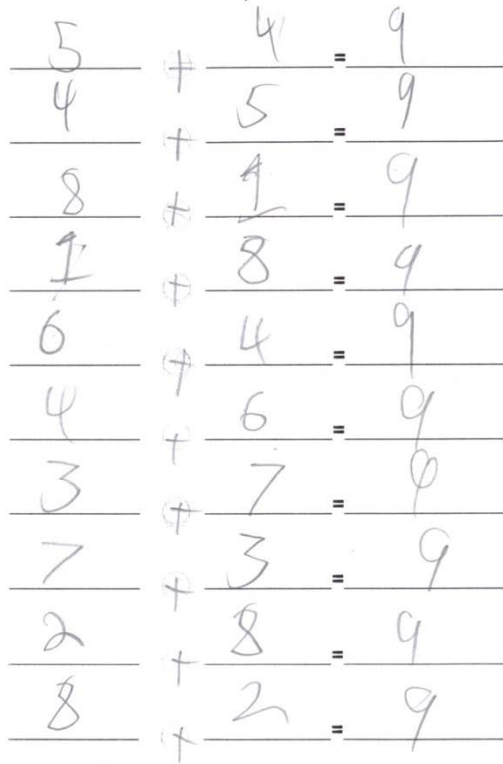
Implications/Next steps: The student needs further assistance attending to precision, specifically with mathematical symbols. An equation template for inputting numbers would provide additional support for a student at this level. The student should be encouraged to ask and answer, "Does this make sense?"

Level 1: Demonstrates Minimal Success (Score Range 0–2)

The student's response shows *few of the elements* of performance that the tasks demand as defined by the Common Core standards. The work shows a minimal attempt at the problem. Communication is limited and shows minimal reasoning. The student's response rarely uses definitions in their explanations. The student struggles to recognize patterns or the structure of the problem situation.

Student G – Level 1 (Score 2)

1. Max and Ruby are playing in the snow. Together they make 9 snowballs. Write 10 number sentences to show all the ways to make 9.



The student has written 10 number sentences on lined paper, each with a horizontal line under the first number and a vertical line under the second number. The equations are as follows:

5	+	4	=	9
4	+	5	=	9
8	+	1	=	9
1	+	8	=	9
6	+	4	=	9
4	+	6	=	9
3	+	7	=	9
7	+	3	=	9
2	+	8	=	9
8	+	2	=	9

Student correctly writes 4 equations, but then switches to addition facts that equal 10 even though he continues to indicate that 9 is the sum.

Work demonstrates a surface understanding of 1.OA.1 and 1.OA.6

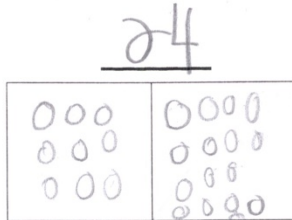
MP.2, MP.6, and MP.7 all need to be strengthened with additional supports.

Grade 1 Math: Fun in the Snow
Annotated Student Work: Level 1

Name _____

Date _____

2. The next day Max made more snowballs. He now has 15 snowballs. Ruby has 9 snowballs. How many more snowballs does Max have than Ruby? Complete the model to show the story:



Write a subtraction sentence to solve the story:

$$\underline{24} - \underline{15} = \underline{9}$$

Write an addition sentence to solve the story:

$$\underline{15} + \underline{9} = \underline{24}$$

The student has not made sense of the problem.

Student writes a correct number sentence but not for this situation. The student demonstrates a lack of understanding of quantities within the context of this problem. The student does not make sense of the problem and incorrectly identifies 24 as the relevant total.

1.OA.1, 1.OA.4, 1.OA.5, MP.1, MP.2, MP.4, MP.6

3. Max had 15 snowballs. Some melted. Now he only has 11.

Write a subtraction sentence to see how many melted:

$$15 - 4 = 11$$

Ruby thinks that subtraction is the only way to show how many melted. Show an addition sentence to prove her wrong:

$$11 + 4 = 15$$

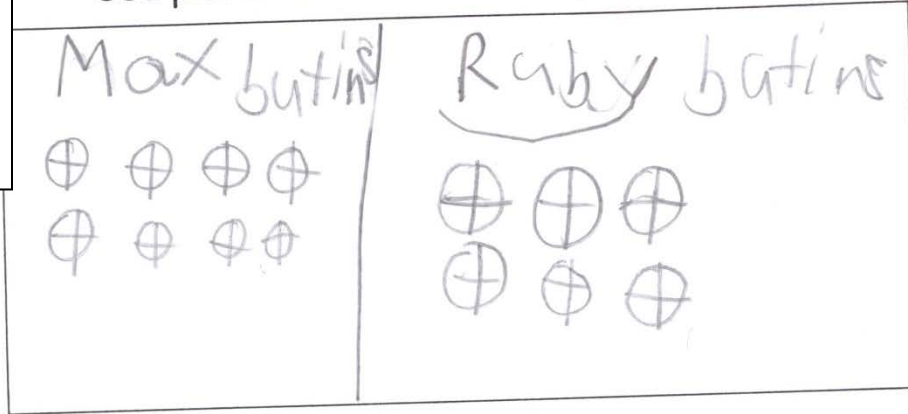
Student indicates knowledge of the quantities posed in the situation. Student reasons quantitatively understanding that 15 represents the total quantity, and 11 represents a part.

1.OA.1, 1.OA.4

MP.1, MP.2

The student has not made sense of the problem. The illustration indicates the comparison of two quantities in the story; the student did not use the picture to solve the problem.

4. There are 18 buttons for Max and Ruby to use on their snowmen. Max uses 8 buttons. Ruby uses 6 buttons. How many buttons are left over?
Use pictures or numbers to prove your answer:



Explain your thinking:

IF Max yous eight buttons and Ruby yous six there whath be enowth if Max want to was more buttons.

Student exhibits a lack of understanding about what the problem is asking and does not recognize 18 as the total.

1.OA.1, 1.OA.6, MP.1, MP.2, MP.3, MP.4, MP.5 all need additional support.

4

Implications/Next steps: It is suggested that this student would benefit from intense work with manipulatives to understand the total and a conversation about the problem before working independently to solve it.



GRADE 1 MATH: FUN IN THE SNOW WITH MAX AND RUBY INSTRUCTIONAL SUPPORTS

The instructional supports on the following pages include a unit outline with formative assessments and suggested learning activities. Each assessment task includes the student copy, teacher copy, detailed information for analyzing the results, and teaching suggestions for implementation based on the common misconceptions.

Teachers may use this unit outline as it is presented or integrate parts of this unit into a related pre-existing curriculum unit.

Unit Outline – Grade 1 Math

Grade 1: Addition and Subtraction within 20

UNIT TOPIC AND LENGTH

This unit should run between 20 and 25 standard periods of instruction, including the pre-assessment (1 period), teaching the formative assessment lesson (2.5 periods), and the final assessment (1 period). This unit should be taught during or after students have learned about addition and subtraction. It will most likely be implemented in December or January.

COMMON CORE LEARNING STANDARDS

Standards for Mathematical Content:

Represent and solve problems involving addition and subtraction.

- **1.OA.1** Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

Understand and apply properties of operations and the relationship between addition and subtraction.

- **1.OA.4** Understand subtraction as an unknown-addend problem. For example, subtract $10 - 8$ by finding the number that makes 10 when added to 8. Add and subtract within 20.

Add and subtract within 20.

- **1. OA.5** Relate counting to addition and subtraction.
- **1. OA.6** Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$); decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$); using the relationship between addition and subtraction (e.g., knowing that $8 + 4 = 12$, one knows $12 - 8 = 4$); and creating equivalent but easier or known sums (e.g., adding $6 + 7$ by creating the known equivalent $6 + 6 + 1 = 12 + 1 = 13$).

Standards for Mathematical Practice:

- **MP.1** Make sense of problems and persevere in solving them.
- **MP.2** Reason abstractly and quantitatively.
- **MP.3** Construct viable arguments and critique the reasoning of others.
- **MP.4** Model with mathematics.
- **MP.6** Attend to precision.
- **MP.7** Look for and make use of structure.

BIG IDEAS/ENDURING UNDERSTANDINGS

- There are multiple interpretations of addition and subtraction of rational numbers and each operation is related.

ESSENTIAL QUESTIONS

- How are situations that involve adding to, taking from, putting together with unknowns in all positions interpreted and solved?

Unit Outline – Grade 1 Math

<ul style="list-style-type: none">➤ Mathematical contents and practices can be applied to solve problems.➤ Understanding of the relationship between addition and subtraction will be evident when students use strategies such as counting up, counting back, and counting all.➤ The repeated use of strategies to solve addition and subtraction problems will result in fluency.	<ul style="list-style-type: none">➤ How can you use a picture or diagram to understand and solve problems?➤ How can subtraction problems be solved by using addition?➤ How is fluency demonstrated?																
CONTENT The students will use knowledge of mathematics to: <ul style="list-style-type: none">➤ Demonstrate fluency of addition and subtraction facts to 10.➤ Utilize strategies to solve addition and subtraction facts to 20.➤ Communicate mathematically by constructing viable arguments and critiquing the reasoning of others.➤ Use counting strategies as a method to solve a problem.	SKILLS <ul style="list-style-type: none">➤ Represent and solve problems involving addition and subtraction, and understand the relationship between the two operations.➤ Add and subtract within 10 fluently.➤ Add and subtract within 20.➤ Interpret the action of a situation to choose an appropriate operation for solving a problem.➤ Make convincing arguments for why strategies work.																
VOCABULARY/KEY TERMS <table><tr><td>less than</td><td>total</td><td>match</td></tr><tr><td>greater than</td><td>same</td><td>more</td></tr><tr><td>related facts</td><td>left over</td><td>mathematical thinking</td></tr><tr><td>fact family</td><td>solve</td><td>question mark</td></tr></table>		less than	total	match	greater than	same	more	related facts	left over	mathematical thinking	fact family	solve	question mark				
less than	total	match															
greater than	same	more															
related facts	left over	mathematical thinking															
fact family	solve	question mark															
PREVIOUSLY LEARNED VOCABULARY/ KEY TERMS <table><tr><td>join</td><td>number sentence</td><td>add</td><td>equal sign</td></tr><tr><td>part</td><td>missing part</td><td>plus sign</td><td>counting on</td></tr><tr><td>whole</td><td>unknown</td><td>subtract</td><td>counting back</td></tr><tr><td>order</td><td>addend</td><td>minus sign</td><td>counting all</td></tr></table>		join	number sentence	add	equal sign	part	missing part	plus sign	counting on	whole	unknown	subtract	counting back	order	addend	minus sign	counting all
join	number sentence	add	equal sign														
part	missing part	plus sign	counting on														
whole	unknown	subtract	counting back														
order	addend	minus sign	counting all														
ASSESSMENTS INITIAL ASSESSMENT: The unit begins with the performance task <i>Brenda’s Beads</i> . The purpose of the assessment is to measure students’ fluency in basic addition and subtraction facts and to measure their skill level in word																	

Unit Outline – Grade 1 Math


problems. The teacher will provide adequate time for all students to complete the task successfully. The students are allowed to use manipulatives such as ten frames, counting cubes, counting chips, extra scrap paper, and any other available resources. The task can be read to the students, and the teacher should adhere to all accommodations stated in IEPs. If needed, a translated edition of the task will be administered for ELLs. Please reference ***Brenda's Beads*** for full details and a chart, which indicates common misunderstandings and support for addressing these common errors.


FORMATIVE ASSESSMENT:

About 3/4 of the way through the unit, teachers would use the *formative assessment*. The formative assessment is entitled ***All Aboard the Train!*** Students should spend approximately 30 minutes on the task. Teacher will provide adequate time for all students to complete the task successfully. The students are allowed to use manipulatives such as ten frames, counting cubes, counting chips, extra scrap paper, and any other available resources. The task can be read to the students, and the teacher should adhere to all accommodations stated in the IEPs. If needed, a translated edition of the task will be administered for ELLS . The formative assessment comes with complete teacher notes. Please reference ***All Aboard the Train*** for full details and a chart which focuses on common misunderstandings and support for focusing on these errors.

FINAL PERFORMANCE TASK:

The final performance assessment is entitled ***Fun in the Snow with Max and Ruby***. It will be administered during a class period. Most students will need 25-30 minutes to complete the task, although time should not be a factor. The teacher will provide adequate time for all students to complete the task successfully. The students are allowed to use manipulatives such as ten frames, counting cubes, counting chips, extra scrap paper, and any other available resources. The task can be read to the students, and the teacher should adhere to all accommodations stated in IEPs. If needed, a translated edition of the task will be administered for ELLs. The task has a specific rubric, as well as samples of annotated student work from all four levels included. Please reference ***Fun in the Snow with Max and Ruby*** for more details. ***Fun In the Snow with Max and Ruby*** addresses DOK Levels 1 and 2.

 **DOK Level 1 Recall & Reproduction:** Question 1 requires the recall of facts in one-step operation problems.

 **DOK Level 2 Skills & Concepts/Basic Reasoning:** Questions 2 and 3 require students to make some decisions on how to approach the problem using basic skills. Question 4 demands reasoning abilities and students must apply their understanding of operations to solve a problem presented in a novel and unrehearsed way. The questions require students to make some decisions on how to approach the problem using basic addition and subtraction skills.

Unit Outline – Grade 1 Math

LEARNING PLAN & ACTIVITIES

The unit is designed with an initial assessment task, a formative assessment task, and a final performance task. This unit is designed to accompany the curriculum a teacher currently uses to teach the topics listed. The elements in the unit will provide activities to foster formative assessment practices, conceptual understanding and non-routine problem solving.

Daily Activities:

Number Talks – A daily ritual with the entire class for the purposes of developing conceptual understanding of numbers, operations, and mathematics. Number talks are used to:

- Review and practice operations, procedures, and concepts of numbers.
- Introduce concepts and properties about numbers.
- Reinforce procedures and number concepts.
- Explore the connections between numbers.

Do a number talk every day for approximately ten minutes.

- Ask questions such as:
 - ✓ How did you think about that?
 - ✓ How did you figure it out?
 - ✓ What did you do next?
 - ✓ Why did you do that? Tell me more.
 - ✓ Did someone solve it a different way?
 - ✓ Who else used this strategy to solve the problem?
- Give yourself time to learn how to:
 - ✓ Record student solutions
 - ✓ Listen to and observe students
 - ✓ Collect notes about student strategies and understanding
- Name/label the strategies that emerge from your students:
 - ✓ Counting on/counting back/counting all
 - ✓ Looking for the unknown
 - ✓ Add on to solve subtraction
 - ✓ Composing/decomposing
- Create a safe environment. When students feel safe, they are comfortable sharing answers without fearing judgment.
- Give opportunities for students to “think first.”
- Encourage self-correction; it’s okay to change your mind, analyze your mistake, and try again.
- Give number talks time to become part of your classroom culture. Expect them to follow the usual learning curve stages.

Unit Outline – Grade 1 Math

Think/Share/Partner: Give students time to think first, and then have them share with a partner to develop competency in communication in mathematics. Students often feel more comfortable sharing their thought process with one student before sharing with the entire group. Students will learn how to justify their answers through continuous implementation of this practice.

Journal Entries for Reflection: Students should have their own math journals where they can write and explain their thinking and strategies each day. Students can free write about a math topic or respond to prompts based on the activity they worked on.

Possible writing prompts:

- ✓ Does it make sense to you? Why or why not?
- ✓ Write a new problem that is different in one way.
- ✓ Write a story problem that...
- ✓ Can you explain how you figured that out?

Purposeful Questioning and Feedback: Purposeful questioning and feedback are instructional supports that can help refocus students' attention to specific aspects of their work. Suggestions based on common misunderstandings students showed in their initial assessment, *Brenda's Beads*, and formative task, *All Aboard The Train*, for example, can be modified to address similar misconceptions shown in other problems. Among the instructional supports are charts suggesting next steps based on common misunderstandings.

Possible question prompts:

- ✓ Did anyone get the same answer in a different way?
- ✓ Tell the class what you were thinking.
- ✓ What would happen if...?
- ✓ What kind of model can you use to defend your solution?

Unit Outline – Grade 1 Math

OVERVIEW OF ACTIVITIES TO SUPPORT INSTRUCTION IN OPERATIONS AND ALGEBRAIC INSTRUCTION

Essential Questions

How are situations that involve adding to, taking from, putting together with unknowns in all positions interpreted and solved?

1.OA.1

ACTIVITIES

Tic Tac Toe
Missing Monkey
Mystery
12 Cats 12 Dogs
Feeding Time
Magic Monkey
Machine

How can subtraction problems be solved by using addition?

1.OA.4

1.OA.5

ACTIVITIES

Making Numbers
Mystery Bag
Ten in a Bag
Feeding Time

How is fluency demonstrated?

1.OA.6

ACTIVITIES

Towers of Ten
Making Numbers
How Many Ways?
Beat the Clock

UNIVERSAL DESIGN FOR LEARNING CONSIDERATIONS

Difficulties in mathematics manifest themselves in many ways. Number reversals are common; word problems may be difficult, particularly if multiple steps are required to solve them. Vocabulary may be difficult. Students lacking basic math skills may have difficulty with fluency. Students with visual perception issues may have difficulty lining up numbers when showing their work. Students with disabilities often have organizational deficits, making it difficult to show work in a logical sequence.

Universal Design for Learning (UDL) is a set of principles that provides teachers with a structure to develop their instruction to meet the needs of a diversity of learners. By creating options for how instruction is presented, how students express their ideas, and how teachers can engage students in their learning, instruction can be customized and adjusted to meet individual student needs. Below are some ideas of how this Common Core task is aligned with the three principles of UDL.

- **REPRESENTATION:** *The “what” of learning.* How does the task present information and content in different ways? How do students gather facts and categorize what they see, hear, and read?

In this task, teachers can...

- Change the size of text or images
- Change the color for emphasis
- Insert images for text
- Scaffold to connect new information to prior knowledge
- Use highlighters to identify new skills
- Pre-teach vocabulary
- Teach key math vocabulary separately and pair it to the lesson
- Create a dictionary of math words with illustrations
- Put key vocabulary on flashcards in words, illustrations, and dominant language
- Present key concepts in different forms (text, illustrations, video, etc.)
- Use highlighters to identify important words in solving a word problem
- Incorporate drawings, diagrams, and visual demonstrations in all lessons
- Color code groups of ones and tens
- Make paper with a green arrow to show where to start the problem
- Create a walk-on number line to assist students with directionality
- Draw lines between columns of numbers during instruction time
- Provide templates (ex. ten frame or part-part-whole template)
- Encourage use of manipulatives

- **ACTION/EXPRESSION:** *The “how” of learning.* How does the task differentiate the ways that students can express what they know? How do they plan and perform tasks?

In this task, teachers can....

- Allow students to provide products using multiple media such as text, speech, drawings, etc.
- When teaching word problems, assist students in identifying irrelevant information
- Incorporate use of manipulatives to allow students to see and understand problems in a concrete manner
- Vary the rate, time, size, and range of motor action required to interact with instructional materials and physical manipulatives
- Pair students struggling with language with students who are strong in oral communication
- Provide templates for self-reflection
- Allow use of a bilingual dictionary
- Use sentence stems during math discussions:
 - Each of these problems has _____
 - The strategy I used to solve this problem is _____
 - Another way I could solve this problem is _____
 - I checked my work by _____

- **ENGAGEMENT:** *The “why” of learning.* How does the task stimulate interest and motivation for learning? How are students engaged in the work? How are they challenged, excited, or interested?

In this task, teachers can....

- Build background knowledge
- Frequently reinforce previously taught skills
- When tracking new concepts, initially focus on the strategy rather than the answer
- Use “think aloud” strategies when teaching new skills
- Provide opportunities for cooperative learning groups
- Design activities that allow students to actively participate and explore (e.g., acting out the problem)
- Differentiate models, scaffolds, and feedback so all students can self-regulate their growth and understanding
- Provide immediate feedback on student work
- Ask students to explain the problem; do not merely ask, “Do you understand?”
- Create a word problem checklist:
 - Read problem to determine the question
 - Reread the problem
 - Highlight important words and /or draw pictures

RESOURCES

Teacher Resources:

- *Learning Through Problems* by Paul R. Trafton & Diane Thiessen
- *TERC Building Number Sense* Grade 1
- *The Missing Monkey Mystery* by Sarah Lauer and Colly Edwards
- www.watchknowlearn.org (click on link for online classrooms). This online classroom has been created to align the Watch, Know and Learn videos with all Common Core State Standards in ELA and Math for Grade 1. Includes student videos and videos for teacher content support.
- Progressions for the Common Core State Standards in Mathematics "K, Counting & Cardinality; K-5, Operations & Algebraic Thinking" at www.commoncoretools.wordpress.com
- *Elementary and Middle School Mathematics: Teaching Developmentally*, by John A. Van de Walle

Student Resources:

- "Math Quiz Game Show" – Interactive Whiteboard Software Lakeshore

Literature Connections:

- *Mission Addition* by Loreem Leedy (learn about addition from the world around you)
- *Sea Sums* by Joy N. Hulone (addition equations)
- *Cats Add Up* by Dianne Ochiltree
- *Domino Addition* by Lynette Long
- *Little Number Stories – Subtraction* by Rozanne Lanczak Williams
- *Little Number Stories – Addition* by Rozanne Lanczak Williams
- *1,2,3 To the Zoo* by Eric Carle
- *Feast For 10* by Cathryn Falwell
- *Monster Math Picnic* by Grace Maccarone
- *I Can Add Up* by Ray Gibson
- *The M&M Counting Book* by Barbara Barbieri McGrath
- *So Many Cats* by Beatrice Schenk De Regnier (about addition and subtraction)
- *Rooster's Off to see the World* by Eric Carle (about addition and subtraction)
- *A Bag Full Of Pups* by Dick Gackenbach (about addition and subtraction)
- *Chrysanthemum* by Kevin Henkes (about addition and subtraction)
- *What's New At the Zoo? An Animal Adding Adventure* by Suzanne Slade
- *Addition Alexander* by Judith Viorst
- *Domino Addition* by Lynette Long (about addition and subtraction)
- *12 Ways to Get to 11* by Eve Merriam (about addition and subtraction)
- *Monster Musical* by Stuart J. Murphy (about subtraction)
- *Twenty is Too Many* by Kate Duke
- *One Monday Morning* by Uri Schulevitz
- *Good-Bye Pie! A First Book of Subtraction* by Tim Healy
- *The Napping House* by Audrey Wood
- *Ten Sly Piranhas* by William Wise

Initial Assessment– Brenda’s Beads

Introduction to Task

- **Purpose:** Measure the knowledge students have in Operations and Algebraic Thinking as they enter this unit.
- **Administering The Task:** Time should not be a factor, and most students will need the task read to them at this stage. Be sure to supply all manipulatives that students may need, such as ten frames, counters and /or part-part-whole template.
- **Analyzing the Results:** Since this is a baseline/initial assessment for the unit, numerical scores are not given. Instead, you should assess the knowledge students bring to the unit. A chart with common misunderstandings and suggestions for addressing them is included.

UDL Supports

- Supply students with color coded manipulatives that match the colors indicated in the word problems.
- Highlight color words in the problem with the appropriate colors to aid students who need language supports.
- Enlarge the text or give students one question per page.

Observations During the Administration of the Task

- Do students use manipulatives or illustrations to assist in solving the problem? (Manipulatives or illustrations are appropriate at this beginning stage. Be sure to encourage both.)
- Are students setting up a correct number sentence? (Students may need additional support with understanding the situations involved in a problem. Encourage students to act out the problem.)
- Do students assume that their first attempt is always correct? (The relationship between addition and subtraction may need to be clarified and retaught.)

Name_____

Date_____

Brenda's Beads

1. There are ten beads in Brenda's box. Four of the beads are red. The rest are green. How many beads are green? Draw a picture and write a number sentence to tell how many green beads are in the box.

2. Brenda has 8 beads. She uses some to make a necklace. The number of beads she uses is the same as the number left over. How many beads could she use to make her necklace? Draw a picture and write a number sentence.

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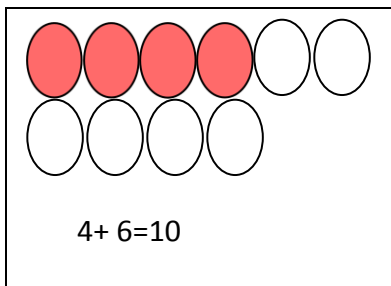
Initial Assessment: Brenda's Beads

Common Misunderstandings	Next Steps
Students set up a correct number sentence, but the numbers in their model do not match the numbers in the problem.	<ul style="list-style-type: none"> • Allow students ample opportunities to practice with problems involving putting together and taking apart, with unknowns in all positions. • Reinforce identifying key components of the situation using manipulatives such as the ten frame. • Guide students to visually represent the quantities named in the situation. <p>MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.6 Attend to precision.</p>
Students set up the correct number sentence, but make minor computation errors.	<ul style="list-style-type: none"> • Give students practice with strategies such as counting on, counting back, and creating easier sums to count on from. • If students are developmentally at the visual stage, provide support with using number lines or illustrations. <p>MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.6 Attend to precision. MP.7 Look for and make use of structure.</p>
Students set up the correct number sentence that does not match the illustration, or students draw a correct illustration that does not match the number sentence.	<ul style="list-style-type: none"> • Students may need reinforcement activities in checking their work. At this stage, students can share their strategies with a peer for feedback. Teacher should also conference with students. • Assist students in trying a second strategy when solving a problem. • Give continuous practice with situations involving the relationship between addition and subtraction. <p>MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.6 Attend to precision. MP.7 Look for and make use of structure.</p>
Students get a number, which is not the same as the number left over.	<ul style="list-style-type: none"> • It is important to review vocabulary, and be sure that all students understand what "the same" represents. Model "the same" by having students act out situations involving "the same." Mathematically proficient students should be able to understand that doubles are "the same." • Teachers should conference with students. Remind them to focus on what the problem is asking; ask them to restate the question. <p>MP.1 Make sense of problems and persevere in solving them. MP.4 Model with mathematics. MP.6 Attend to precision. MP.7 Look for and make use of structure.</p>

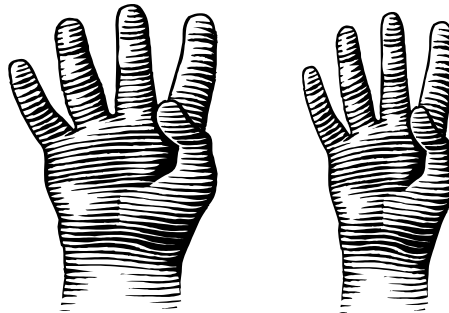
Brenda's Beads

1. There are ten beads in Brenda's box. Four of the beads are red. The rest are green. How many beads are green? Draw a picture and write a number sentence to tell how many green beads are in the box.

One possibility



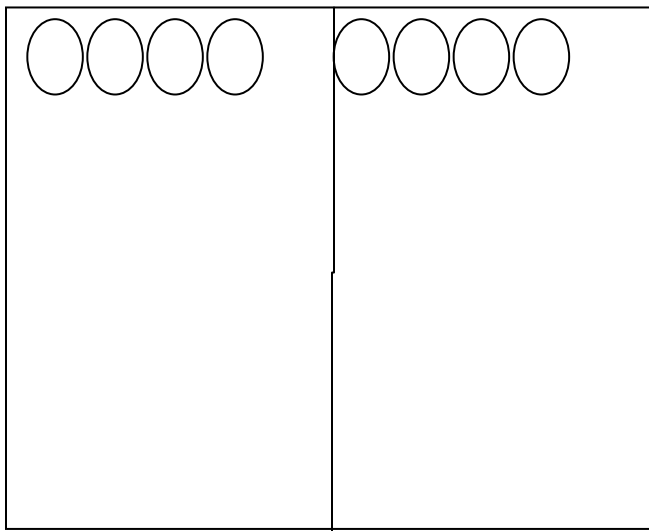
Second Possibility



Student shows 4 fingers and then counts on to 10, indicating 6 more.

Accept any mathematical strategy resulting in a correct answer.

2. Brenda has 8 beads. She uses some to make a necklace. The number of beads she uses is the same as the number left over. How many beads could she use to make her necklace? Draw a picture and write a number sentence.



$$\underline{4} + \underline{4} = \underline{8}$$

Formative Assessment– All Aboard The Train!

Introduction to Task

- Purpose:** To measure the knowledge students have acquired this far in Operations and Algebraic Thinking. The results can be used to plan further instruction before the Performance Task is administered.
- Administering The Task:** Time should not be a factor. Most students will need the task read to them at this stage. Be sure to supply all manipulatives that students may need, such as ten frame, counters and/or part-part-whole template.
- Analyzing the Results:** Since this is a formative task, assigning a numerical score might be helpful. A chart with common misunderstandings and suggestions for addressing them is included.

UDL Supports

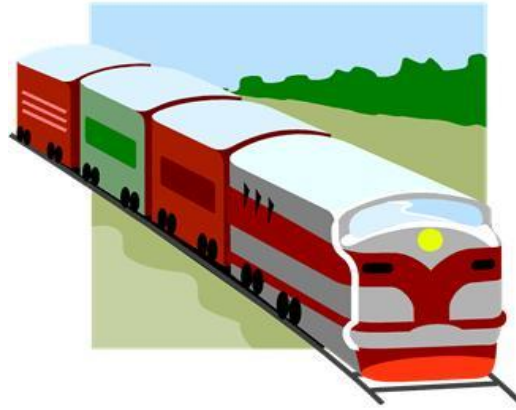
- Supply students with color coded manipulatives that match the colors indicated in the word problems.
- Highlight color words in the problem with the appropriate colors to aid students who need language supports.
- Enlarge the text or give students one question per page, for example in Question 2 you may need to draw the train cars as a template.

Observations During the Administration of the Task

- Can students persevere and write all possible combinations? (Give students opportunities to explore situations in which many responses are required. Encourage them to keep going.)
- Do students use a variety of strategies to find the sum? Are they making easier sums, such as combinations to get to 10 and then add on? (Give students situations to solve that include multiple strategies, such as counting up from a beginning number.)
- Have students developed strategies to identify the unknown addend? (The relationship between addition and subtraction may need to be clarified and retaught.)

Name _____

ALL ABOARD THE TRAIN!



1. White Plains has a train parked in the train station. The train has 8 cars. Some cars are red. Some are blue. What are all of the possible color combinations of the 8 cars? Write a number sentence for each of the combinations.

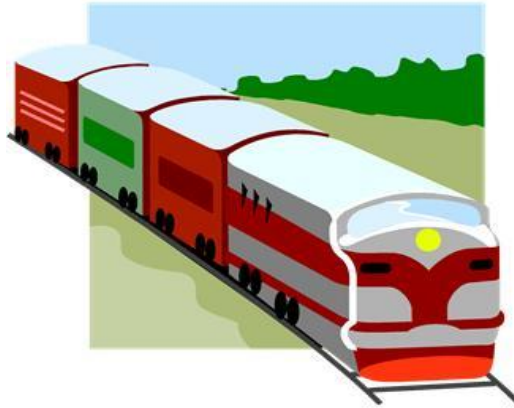
2. There are passengers on the train at the station. There are 4 passengers on the first car. The third car has 6 passengers. The last car has 7 passengers. How many passengers are there in total? Use your words, pictures, and numbers to explain your mathematical thinking.

3. There are two trains at the station. Both trains have the same total number of passengers. One train has 14 passengers. The other train has 2 passengers on the first car, 5 passengers on the third car and the rest of the passengers are on the last car. How many passengers are on the last car? Use pictures and numbers to explain your mathematical thinking.

Formative Assessment: All Aboard The Train

Common Misunderstandings	Next Steps
<p>Students are able to write some, but not all number sentences for the possible color combinations.</p>	<ul style="list-style-type: none"> • Provide students who exhibited difficulty with this question ample opportunity to construct all possible combinations of various numbers with manipulatives. • Give students practice with problems that require more than one solution. <p>MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.6 Attend to precision. MP.7 Look for and make use of structure.</p>
<p>Students set up the correct illustration, but do not attempt to use words or numbers.</p>	<ul style="list-style-type: none"> • Students who did not express their thoughts in writing may need opportunities to express their thoughts orally with both the teacher and peers. • Provide opportunities for oral expression with feedback in the form of questioning so students have the opportunity to clarify their thoughts. • Assist students as they practice putting their words to print. • Provide practice in matching numbers to their words or illustrations. <p>MP.1 Make sense of problems and persevere in solving them. MP.3 Construct viable arguments and critique the reasoning of others. MP.4 Model with mathematics. MP.6 Attend to precision.</p>
<p>Students have correct number sentence but illustration is not correct / illustration is correct but number sentence does not match.</p>	<ul style="list-style-type: none"> • Ask students to explain their work to a partner for feedback while you observe. Ask students how they checked their work for accuracy. • Mathematically proficient students will be able to use multiple strategies and be able to see the relationship between addition and subtraction. When students understand the relationship, they will become fluent in checking their work by using the relationship. <p>MP.1 Make sense of problems and persevere in solving them. MP.2 Reason abstractly and quantitatively. MP.3 Construct viable arguments and critique the reasoning of others. MP.4 Model with mathematics. MP.6 Attend to precision.</p>

ALL ABOARD THE TRAIN!



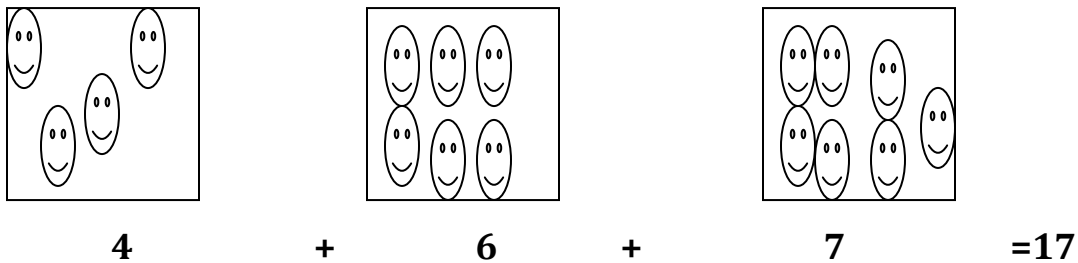
1. White Plains has a train parked in the train station. The train has 8 cars. Some cars are red. Some are blue. What are all of the possible color combinations of the 8 cars? Write a number sentence for each of the combinations.

$7+1=8$ $6+2=8$ $5+3=8$ $4+4=8$ $3+5=8$ $2+6=8$ $1+7=8$

- $0+8=8$ is not acceptable since the directions stated that some are red and some are blue.
- Zero would indicate that one color was not represented.

2. There are passengers on the train at the station. There are 4 passengers on the first car. The third car has 6 passengers. The last car has 7 passengers. How many passengers are there in total? Use your words, pictures, and numbers to explain your mathematical thinking.

One Possibility



Explanations in words will vary depending on illustration and the level the student is at; some acceptable responses are:

- I drew the people and counted all of them.
- I know that $4+6=10$ and then I counted on 7 more and got 17.
- I know that $4+6=10$ and then I used my fingers to count 7 more.
- I used the ten frame (student's drawing would resemble the appropriate amount on a double ten frame).

3. There are two trains at the station. Both trains have the same total number of passengers. One train has 14 passengers. The other train has 2 passengers on the first car, 5 passengers on the third car and the rest of the passengers are on the last car. How many passengers are on the last car? Use pictures and numbers to explain your mathematical thinking.

One Possibility

14		
2	5	?

Possible Explanations

- I know $2+5=7$ and $7+7=14$ (doubles fact)
- I know $2+5=7$ and then I counted backwards 7 place from 14 and got 7
- $14-7=7$
- I did $14-2=12$ then I did $12-5=7$

LEARNING ACTIVITIES OVERVIEW

Each of the Learning Activities which follow strengthens both the standards and mathematical practices listed in the Unit Outline. You may wish to use all activities or just choose the ones that will strengthen the areas of weakness exhibited in the tasks you have administered.

Each Learning Activity includes a step-by-step procedure for implementing the activity. Feel free to make any adjustments as needed. In addition, each activity includes UDL supports and differentiated suggestions. The arc of learning is included in each activity so you can understand what students have been exposed to in kindergarten and what the expectations are for second grade.

In order to plan accordingly, assessment is built into each activity. The individual results of the assessment will assist you in determining which activity needs to be implemented next. Mathematically proficient students should be able to assess their own work and determine their strengths and weaknesses. In order to support this, we have included a student self-assessment in the form of a checklist.



TOWERS OF TEN

OVERVIEW

Summary of Activity: Students will build towers of ten cubes to represent possible combinations of sums to ten. They will only use two different colors of cubes to discover various possibilities that exist.

Common Core Standards:

- ✓ 1. OA. 6 Add and subtract within 20, demonstrating fluency for addition and subtraction within 10.

Mathematical Practices:

- ✓ MP.2 Reason Abstractly and Quantitatively
- ✓ MP.4 Model with Mathematics
- ✓ MP.6 Attend to Precision
- ✓ MP.7 Look for and Make Use of Structure

Essential Questions:

- ✓ What are all the possible combinations to compose ten?
- ✓ Does the order of the numbers affect the total?
- ✓ If one more of one color is used, how will the quantity of the other color be affected?

Vertical Alignment:

- ✓ K.OA.4 For any number from 1 to 9, find the number that makes 10 when added to the given number.
- ✓ 2. OA.2 Fluently add and subtract within 20.

MATERIALS AND RESOURCES

Instructional Materials: unifix cubes, paper, and pencil

Resources: Book to read to class – *Mission: Addition* by Loreen Leedy
Web Based Games to Practice Addition www.fun4thebrain.com/addition.html

IMPLEMENTATION

Procedure:

- ✓ Students should work in pairs; each pair should be given two different colors of cubes.
- ✓ The students' should create towers of ten.
- ✓ The pairs can work together to create one tower or create two towers which look different.
- ✓ Students should compare and tell how the towers are different. Students should also write the number model that matches their tower.
- ✓ Assist students as they make all the possible combinations of towers.
- ✓ Engage students in conversation, for example, if I have four red and six blue, is it the same amount as six red and four blue?
- ✓ As students build their towers, try to engage them in discovering the second addend from mental strategies rather than counting on. (Build Fluency)

Differentiated Instruction:

- ✓ Enrichment: Instead of using two colors of cubes, use three different colors of cubes to make sums of ten.
- ✓ Struggling Students: Some students may need to start with smaller towers, for example composing towers of six.

UDL Supports:

- ✓ Means of Representation: If students exhibit difficulty counting to ten, a tower template may help.
- ✓ Means of Representation: Instead of having students record number sentences with a pencil, give students the colored crayon that matches the unfixed cubes they used so they can relate the number of cubes to the actual written number (quantity).
- ✓ Means of Action & Expression: In addition to composing a tower and recording number sentences, some students may benefit from coloring in the tower on their template with the appropriate colors and quantity. In addition, this will support students' self reflection on quality.
- ✓ Multiple Means of Engagement: Some students may benefit from not taking their towers apart, but leaving them as models to ensure they are not duplicating towers. Students may benefit from assistance in organizing the towers by color.

Assessment:

- ✓ Teachers can conference with students to assess success of lesson and plan further instruction. Some sample questions for assessment are: If I have 4 red cubes, how many green cubes would I need to make a tower of ten? If I have 6 green cubes and 4 red cubes and I want to add a green cube, what will happen to the red cubes?

REFLECTION

When reflecting on the activity, consider the following:

- ✓ Did students actively participate during the lesson? If not, what adjustments need to be made to allow all to actively participate?
- ✓ What does the assessment data tell you about the design of the next lesson?

Activity adapted from: *The Core Curriculum Companion for the New York State Mathematics Resource Guide*



Mystery Bag

OVERVIEW

Summary of Activity: In partnerships, students will have a ‘mystery bag’ filled with 20 counters. One student will pull a handful of counters out of the bag while the other keeps the closed mystery bag. The students will work together to complete the graphic organizer and identify the missing addend, the number of counters left in the bag. As they continue to explore the relationship between addition and subtraction, they will create a number sentence for each operation to represent that round of the game.

Common Core Learning Standards:

- ✓ 1.OA.4. Understand subtraction as an unknown-addend problem.
- ✓ 1.OA.5. Relate counting to addition and subtraction.

Mathematical Practices:

- ✓ MP.1 Make sense of problems and persevere in solving them.
- ✓ MP.2 Reason abstractly and quantitatively.
- ✓ MP.4 Model with mathematics.
- ✓ MP.7 Look for and make use of structure.

Essential Questions:

- ✓ How can I guide my students in recognizing the relationship between addition and subtraction?
- ✓ How can various number sentences be created to represent one problem?
- ✓ How can an unknown be represented?

Vertical Alignment:

- ✓ K.OA.1. Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.
- ✓ 2. OA.1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions.

MATERIALS AND RESOURCES

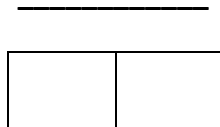
Instructional Materials: paper bags, unifix cubes (any additional manipulative you use in your classroom to represent addition and subtraction), graphic organizers for partnerships (see attached), pencils, ten-frame.

Resources: <http://www.fuelthebrain.com/Game/play.php?ID=69> (missing addend online game)

IMPLEMENTATION

Procedure:

- ✓ Introduce the template below (used in question #2 of the final task) for students to use in this activity



- ✓ In partnerships, students are given a 'mystery bag' filled with 20 counters, cubes or tiles.
- ✓ One partner takes a handful out of the bag while the other keeps the rest hidden inside.
- ✓ The pair begins to complete the graphic organizer by noting how many counters were removed from the bag and writing a question mark to represent the unknown number of counters left inside.
- ✓ Partners create a number sentence to represent their work so far and then solve for the unknown.
- ✓ Students will double check their answer with an addition sentence.
- ✓ Finally, the students open the mystery bag to determine whether they completed the task properly.
- ✓ All counters are returned to the bag, and the other partner takes a turn to pull a handful as the steps are repeated.

Differentiated Instruction:

- ✓ There are three versions of the graphic organizer, so each child can receive the guidance they need while continuing to be challenged.
- ✓ Struggling students: Begin the activity with 10 counters in the bag and build up to using 20.

UDL Supports:

- ✓ Means of Representation: If students exhibit difficulty determining the missing addend, a ten frame (or two for 20 counters) may be helpful. Guide students to place pulled counters in the frame before determining the missing addend. Lesson can begin with all counters filling the frame so students recognize the total (see attached).

- ✓ Means of Representation: Students may be overwhelmed by the graphic organizer, show them how to use a blank piece of paper to cover all columns except the one they are currently considering.
- ✓ Means of Action and Expression: It may be helpful for struggling students to draw the counters in the graphic organizer before writing the numbers.

Assessment:

- ✓ Teacher should be taking notes during activity and making decisions about the appropriate graphic organizer for each student. Can students be pushed to a higher level? A certain degree of struggle is appropriate for mathematics because it builds perseverance.
- ✓ Teachers should look for clarity and precision in students' written work as well as in their verbal communication. Look closely at graphic organizers to understand where misunderstandings are occurring.
- ✓ Are students understanding the relationship between addition and subtraction?

REFLECTION

When reflecting on the activity, consider the following:

- ✓ How might I use the strategies acquired for demonstrating the relationship between addition and subtraction outside of the classroom? How can I incorporate problems based on this knowledge during recess, lunchtime, on a trip, etc.?
- ✓ How could this activity been more effective for my particular students?

Name of Partners _____

Date _____



Mystery Bag



Total	Pulled Out	Left in Bag	Number Sentence	Mystery Solved!	Double Check with addition!
20	11	?	$20 - 11 = ?$	9	$9 + 11 = 20$
20		?	$\underline{\quad} - \underline{\quad} = \underline{\quad}$		$\underline{\quad} + \underline{\quad} = \underline{\quad}$
20		?	$\underline{\quad} - \underline{\quad} = \underline{\quad}$		$\underline{\quad} + \underline{\quad} = \underline{\quad}$

20		?	$\underline{\quad} - \underline{\quad} = \underline{\quad}$		$\underline{\quad} + \underline{\quad} = \underline{\quad}$
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Student Resource

Name of Partners _____ Date _____



Mystery Bag



Total	Pulled Out	Left in Bag	Number Sentence	Mystery Solved!	Double Check with addition!
20	11	?	$20 - 11 = ?$	9	$9 + 11 = 20$
		?	$\underline{\quad} - \underline{\quad} = \underline{\quad}$		$\underline{\quad} + \underline{\quad} = \underline{\quad}$
		?	$\underline{\quad} - \underline{\quad} = \underline{\quad}$		$\underline{\quad} + \underline{\quad} = \underline{\quad}$

		?	$\underline{\quad} - \underline{\quad} = \underline{\quad}$		$\underline{\quad} + \underline{\quad} = \underline{\quad}$
		?	$\underline{\quad} - \underline{\quad} = \underline{\quad}$		$\underline{\quad} + \underline{\quad} = \underline{\quad}$

Student Resource

Name of Partners _____ Date _____



Mystery Bag



Total	Pulled Out	Left in Bag	Number Sentence	Mystery Solved!	Double Check with addition!
20	11	?	$20 - 11 = ?$	9	$9 + 11 = 20$

Tic-Tac-Toe

OVERVIEW

Summary of Activity: This activity is designed to increase students' abilities to *explain their thinking* as they identify the strategy they implemented in order to solve a problem. This activity will also provide students with multiple opportunities to apply concepts they know to new, unfamiliar problems. Students will be presented with various word problems involving subtraction and addition. They will solve the same problem repeatedly with the goal of successfully using as many different strategies as possible.

Common Core Standards:

- ✓ 1.OA.1. Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.

Mathematical Practices:

- ✓ MP.1 Make sense of problems and persevere in solving them.
- ✓ MP.2 Reason abstractly and quantitatively.
- ✓ MP.3 Construct viable arguments and critique the reasoning of others.
- ✓ MP.4 Model with mathematics.
- ✓ MP.6 Attend to precision.

Essential Questions:

- ✓ How can I guide my students in recognizing the relationship between addition and subtraction?
- ✓ How can a single situation be represented and solved in different ways?
- ✓ How can I provide students with the language they need to explain their thinking?

Vertical Alignment:

- ✓ K.OA.1. Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.
- ✓ 2. OA.1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

MATERIALS AND RESOURCES

Instructional Materials: story problems (teacher-created resource), tic-tac-toe boards (see attached), counters, or other small objects to use as game pieces; pencils, SmartBoard or projector

IMPLEMENTATION

Procedure:

- ✓ Each player (can be done with whole class or small group) is given a blank tic-tac-toe board and a pencil.
- ✓ Teacher reads story problem and leaves it on SmartBoard or projector for kids to refer back to.
- ✓ Students try to solve the problem as many times as they can using various strategies. Students record their work in the box of the strategy they used.
- ✓ When students believe they have used as many strategies as they can, a peer or a teacher checks the work. If it is correct, the student can place a counter over that space.
- ✓ They can also try to 'check their answer' using another strategy on the board in an effort to get three boxes in a row.
- ✓ Before moving on to another problem and board, give students an opportunity to share strategies they used to practice *explaining their thinking* and teach others who may not have been able to implement that strategy independently.
- ✓ Game can be played for fun or for points. If keeping score, each time a child earns 'three in a row' they receive a point. Continue playing to a certain number of points (time dependent.)

Differentiated Instruction:

- ✓ Struggling students: Keep another board to the side with a sample problem solved using each box. This will give them a model of how to apply each strategy as they work.
- ✓ Word problems can be differentiated to appropriately challenge individual students.
- ✓ Strategies listed in tic-tac-toe board can be changed to match the levels of students' thinking.

UDL Supports:

- ✓ Means of Representation: Students can use blank paper to block out tic-tac-toe squares so only one shows at a time, making board less overwhelming.
- ✓ Means of Representation: If necessary, add an illustration to each strategy on the tic-tac-toe board to aid those students who are hindered by text.

Assessment:

- ✓ Students' tic-tac-toe boards can be used as an assessment tool. Evaluate student work to see which strategies they are comfortable using and understand as well as which strategies still seem confusing.
- ✓ Students' verbal explanations will demonstrate their ability to use the vocabulary of the specific strategies as they explain their thinking. Verbal proficiency will result in written proficiency.
- ✓ Teachers should look at future math work to identify which students are applying the knowledge learned from this lesson and which students continue to need reminders to explain their thinking in a detailed manner.

REFLECTION

When reflecting on the activity, think about the following:

- ✓ Do students rely on one particular strategy every time? How can I guide them into utilizing multiple strategies?
- ✓ Are students applying the different strategies but struggling to explain their thinking as they share their work? What steps need to be taken to guide them in this process?

Name _____ Date _____

Tic-Tac-Toe

How well can you **explain your thinking?**

Draw a picture	Create a number sentence	Use a doubles fact
Use a friendly fact	FREE	Count down/count back
Make it to 10	Count up	Part-Part-Whole



The Missing Monkey Mystery

OVERVIEW

Summary of Activity: This lesson introduces the concept of finding missing numbers in number sentences. It is expected that students are familiar with addition to 20, writing number sentences, adding three addends, and the following vocabulary: *addend*, *equal*, and *sum*. During this lesson, the students will help the monkey trainer figure out how many monkeys are missing and will increase their knowledge of addition facts to 20.

Common Core Standards:

- ✓ 1. OA.1 Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
- ✓ 1. OA. 4 Understand subtraction as an unknown-addend problem.

Mathematical Practices:

- ✓ MP.1 Make sense of problems and persevere in solving them.
- ✓ MP.2 Reason abstractly and quantitatively.
- ✓ MP.4 Model with mathematics.
- ✓ MP.6 Attend to precision.

Essential Questions:

- ✓ How can I guide my students in discovering the missing addend in a real world situation?
- ✓ How can I facilitate students to use data in pictures to help find missing numbers in number sentences?
- ✓ How can an unknown be represented?

Vertical Alignment:

- ✓ K.OA.1. Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.
- ✓ K.OA.2. Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.
- ✓ 2. OA.1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using

drawings and equations with a symbol for the unknown number to represent the problem.

- ✓ 2. OA.1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

MATERIALS AND RESOURCES

Instructional Materials: Ten frames, Chart paper, pencils, 1 post-it for each student, Student Resource 1 “Trixie’s Letter,” Student Resource 2A “Missing Monkeys” Direction Sheet (1 per pair,) Student Resource 2B “Monkey Cards” (Copy 4 pages per pair). *Prepare 15 bags of Monkey Cards, 20 cards per bag. Include a copy of the directions inside the bag. For the second half of this lesson, you will need: Student Resource 3A “Capture the Monkey” directions, Student Resource 3B “Cage,” and a cup (1 of each per pair). Each pair will also need 20 cubes. **Prepare one bag per pair with all of their items.

Resources: www.watchlearnknow.org video “Mental Math Strategies: Addition & Subtraction relationship”

IMPLEMENTATION

Procedure:

- ✓ (Pre Assessment) Give each student a sticky note to solve the following problem, and write the following problem on chart paper: “Kim has 16 fries on her lunch tray. She gets up to get a napkin and when she returns, she only has 10 fries on her lunch tray. How many fries are missing from Kim’s lunch tray?”
- ✓ Ask students to write a number sentence to show how they solved the word problem. Have the students place the sticky note in his or her desk until the end of the lesson.
- ✓ (Engagement) Read “Trixie’s Letter” to the class. Create an atmosphere of excitement about helping the circus trainer.
- ✓ (Exploration) Provide each pair of students with a bag titled “Missing Monkeys” containing the Missing Monkeys directions and monkey cards. Model how to play the game but do not teach students how to solve for the missing number. Observe as students play “Missing Monkeys,” and take notes on how students apply their own problem solving skills.
- ✓ (Explanation) Bring class back to meeting area. Instruct the students to ‘Turn and Talk’ with their partner about how they decided how many monkeys were missing. Afterwards, have pairs share with the class and chart these responses.

- Examples of possible responses include: I looked at how many monkeys were there and counted on to 20. I know $10 + 10 = 20$; I saw 10 so I knew my partner hid 10 cards.
- Ask: What is another way to make 20? Confirm and clarify student responses as they share. Use “Missing Monkeys” game to model how to use the “count on” strategy to find the missing number. Practice a few times up to 20.
- ✓ Write this rhyme on chart paper: “Trixie, Trixie, some of the monkeys are gone. To solve this problem, we must count on!” Have students chant rhyme to reinforce the strategy.
- ✓ (Application) Give student pairs the second set of prepared bags with the “Capture the Monkey” items. Model how to play the game “Capture the Monkey” and then let students play as you informally observe students using the taught ‘count on’ missing number strategy (anecdotal notes).

Differentiated Instruction:

- ✓ If students are struggling with the sum of 20, reduce the number.
- ✓ Pull small group of struggling students and play either game together. Stop often to model strategies, ‘think out loud,’ and move manipulatives to increase understanding.
- ✓ Provide students with 2 ten-frames. Guide students to fill the frame with the items showing and use the blank spaces and the count on strategy to help identify what is missing.

UDL Supports:

- ✓ Means of Representation: some students may need to write the numbers and view the monkeys in front of them at the same time to make the connection between the numeral and the amount.
- ✓ Means of Action: Students may need concrete strategies for counting on, supply number lines to manipulate.

Assessment:

- ✓ Have students summarize the lesson by revisiting Kim’s lunch-time story and their sticky notes. Give students a chance to change their answers. Share the solution together. Any of the following number sentences are acceptable: $10 + 6 = 16$; $6 + 10 = 16$; $16 - 10 = 6$; $16 - 6 = 10$.
- ✓ Anecdotal notes from lessons and student performance in games.

REFLECTION

When reflecting on the activity, think about the following:

- ✓ Did students actively participate during the lesson? If not, what adjustments need to be made to allow all to actively participate?
- ✓ What does the assessment data tell you about the design of the next lesson?

Adapted From: *The Missing Monkey Mystery* by Sarah Lauer and Colly Edwards

- ✓ http://www.nsa.gov/academia/_files/collected_learning/elementary/arithmetic/The_Missing_Monkey_Mystery.pdf

Trixie's Letter

Student Resource 1

Dear _____'s First Grade Class,

Hi! My name is Trixie. I am a trainer for the Monkey Brothers Traveling Circus. I need your help. I have many animals in my care. I was wondering if you could help me watch the monkeys while I am training the other animals. It would be a simple job. You just need to make sure the monkeys stay in their cages. There is always the same amount of monkeys in each cage.

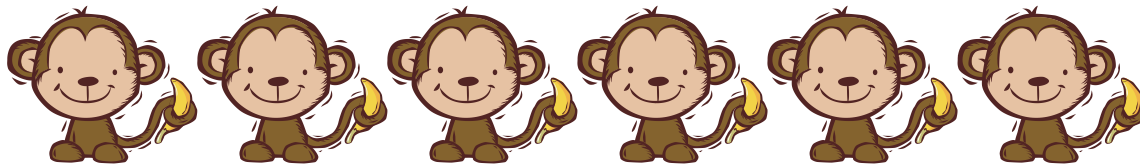
I will meet you in front of the animal tent and introduce you to the monkeys. So that you are prepared for your new job, I am sending your teacher several games for you to play that will prepare you for your job. Good luck in your preparations. I will see you in a few days!

Your friend,

Trixie

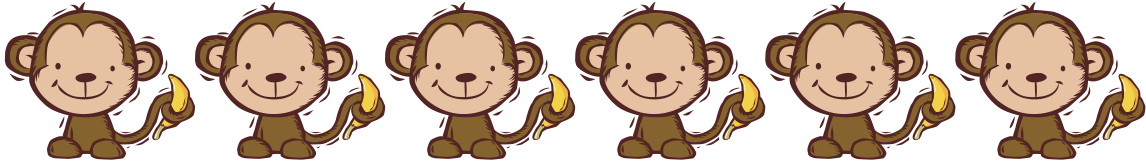
Missing Monkeys Directions

1. Place cards on a flat surface face up.
2. Partner #1 will close his/her eyes, while Partner #2 takes some monkeys and hides them behind his/her back.
3. Partner #1 will open his/her eyes and tell Partner #2 how many monkeys are missing. Check to see if you were right.
4. Repeat steps 1-3 while taking turns.



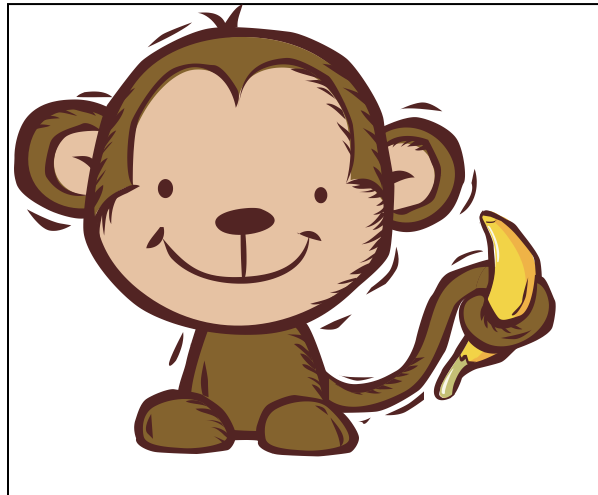
Missing Monkeys Directions

1. Place cards on a flat surface face up.
2. Partner #1 will close his/her eyes, while Partner #2 takes some monkeys and hides them behind his/her back.
3. Partner #1 will open his/her eyes and tell Partner #2 how many monkeys are missing. Check to see if you were right.
4. Repeat steps 1-3 while taking turns.



Monkey Cards

Student Resource 2B



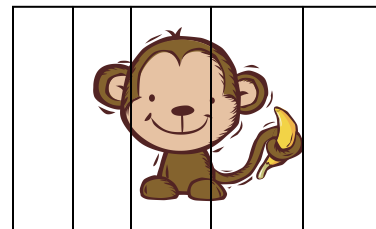


Capture the Monkeys Directions

Student Resource 3A

Capture the Monkeys

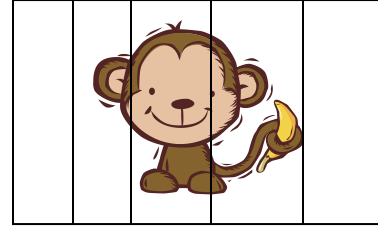
1. Place 20 cubes into the cup. Partner #1 will gently shake the cup and spill some of the cubes onto the cage.
2. Partner #2 will tell Partner #1 how many cubes are left in the cup.
3. Use the count on strategy. Check to see if you are right.
4. Repeat steps 1-3 while taking turns.



Capture the Monkeys

1. Place 20 cubes into the cup. Partner #1 will gently shake the cup and spill some of the cubes onto the cage.

2. Partner #2 will tell Partner #1 how many cubes are left in the cup.
3. Use the count on strategy. Check to see if you are right.
4. Repeat steps 1-3 while taking turns.



Monkey Cage

Student Resource 3B

The Missing Monkey Mystery, Feeding Time



OVERVIEW

Summary of Activity: This lesson continues to introduce the concept of finding missing numbers in number sentences. This lesson introduces the equal sign as *the same as* and guides students to balance both sides of an equation. During this lesson, the students will help the monkey trainer feed the monkeys the same amount of bananas and increase their knowledge of finding the missing addend.

Common Core Learning Standards:

- ✓ 1. OA.1. Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
- ✓ 1. OA.4. Understand subtraction as an unknown-addend problem.
- ✓ 1.OA.5. Relate counting to addition and subtraction.

Mathematical Practices:

- ✓ MP.1 Make sense of problems and persevere in solving them.
- ✓ MP.2 Reason abstractly and quantitatively.
- ✓ MP.4 Model with mathematics.
- ✓ MP.6 Attend to precision.

Essential Questions:

- ✓ How can I guide my students in discovering the missing addend in a real world situation?

- ✓ How can I facilitate students to use data in pictures to help find missing numbers in number sentences?
- ✓ How can an unknown be represented?

Vertical Alignment:

- ✓ K.OA.1. Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations
- ✓ K.OA.2. Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.
2. OA.1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

MATERIALS AND RESOURCES

Instructional Materials: Student Resource 4 “What If...”, Student Resource 2B “Monkey Cards,” Student Resource 5 “What’s the Addend?” sentence strip saying “is the same as,” Student Resource 6A “Balancing Bananas”(laminated if possible, one per pair of students), sticky notes, 2 color counters, Student Resource 6B “Balancing Bananas Directions,” Student Resources 6C and 6D “Balancing Bananas Cards” (Cut. Copy 6C onto color 1 and 6D onto color 3.) One of each color per pair of students.

Prepare 15 bags of: Student Resource 6A, 6B, “Balancing Bananas Cards,” 36 color counters, dry erase marker and erasers (tissues).

IMPLEMENTATION

Procedure:

- ✓ (Pre-assessment): Distribute student copies of “What if...” and ask them to solve the four mysteries. This task is based on their previous activity and should give the teacher a snapshot of how their students internalized the material and count on strategy so far.
- ✓ (Engagement): Call students to a meeting area. Review what was taught yesterday by sharing strategies and answers to “What if...” highlighting students who applied the counting on strategy. Chant *Trixie* rhyme with students a few times.
Tell students that you will be showing them a number trick. Place a set of 17 monkey cards on the floor. Call a volunteer to the front. Tell the volunteer to take some of the Monkeys and hold them behind his or her back. Tell the class you won’t peek but you’ll be able to guess how many cards the volunteer is hiding. Say: I will be able to read your mind. Keep repeating the number of monkeys in your head so I can read your mind.

- ✓ Announce how many Monkeys are behind the volunteer's back by subtracting, in your head, the number of cards on the floor from 17. Have students turn and talk to a see if they can figure out how you did the trick. The children should say "You counted on from the number on the floor up to 17." Ask "Was it magic or math?" Have a student explain the math behind the magic. Choose a student to take your place and perform the trick.
- ✓ (Exploration): Tell students to go to their seats. Ask students if they know what *balance* means. Give students a copy of Student Resource 5 "What's the Addend?" Tell students to work with the person next to them to try and make the bananas balance by having the same amount of bananas on each side.
 - Ask a student pair to share their findings and explain their thinking. If the class is struggling, point out that there are three bananas on the left side with some missing in the empty box. Tell students the right side has 12 bananas. They will need to figure out what number belongs in the empty box to make the sides balance. They can use counters if necessary. Let students try again with this new information.
- ✓ (Explanation): Bring class back to meeting space. Let partnerships explain their thinking and solution to the problem. Students should say "I started with three and I counted on to 12. My answer was 9."
 - Teach students that the middle of the balance is like an equal sign in an equation or number sentence. The equal sign tells that both sides of the number sentence are the same or equal. When you see an equal sign today, you are going to say "is the same as." Show students the sentence strip and give students the number sentence $5+3=8$ and tell them we can say "5 plus 3 is the same as 8" Ask students: What are other ways to make 8?
- ✓ Say to students: Today you will play a game to help Trixie feed the monkeys. She needs to feed them the same amount. The object of the game is to get the bananas to balance. There should be the same number on both sides. (Model the game as you think aloud using Student Resource 6A.) If I have 4 bananas on the left side of the balance, and I have 12 bananas on the right, I know some bananas are missing from the left. I will use my counters to count on to 12. I know 8 bananas are missing. Next I will write a number sentence below using the number of bananas on the balance. (Write $4+8=12$ on a sticky note. Remind students to use a new sticky note for each new problem.)
- ✓ (Application): Provide each pair of students with a bag titled "Balancing Bananas" (prepared as listed in materials). Allow students to take more sticky notes as needed.
 - Take anecdotal notes while observing how students apply their own problem-solving skills. As you walk around the room, use the completed sticky notes as a quick assessment for correct answers and to decide who needs re-teaching.

Differentiated Instruction:

- ✓ Pull a small group of struggling students and play the game together. Stop often to model strategies, ‘think out aloud,’ and draw to increase understanding. Use counters and ten frame instead of banana cards if a stronger visual is needed.
- ✓ Challenge: Bring children who are ready to the rug and quickly model playing “Balancing Bananas” with an additional addend. Students should not need counters at this point. See if they can use mental math or whether they can find a ‘Balancing Banana’ card that makes the number sentence complete.

UDL Supports:

- ✓ Means of Representation: Students may need additional manipulatives and paper to work on the Monkey in the Cage task, allow for a box to place the actual manipulative in to represent the monkeys in the cage.
- ✓ Means of Representation: For linguistically diverse classroom, be sure students know what a monkey is and show illustrations of monkeys in the zoo or the wild.
- ✓ Means of Action: Some students may need a hands-on experience with a concrete balance to understand how it actually works. Place 12 cubes on one side, 4 on the other, and then allow children time to explore how many more will make it balance
- ✓ Means of Engagement: Allow students who need support to work with a buddy.

Assessment:

- ✓ Teachers should look at future math work to identify which students are applying the knowledge learned from this lesson and which students continue to need reminders to explain their thinking in a detailed manner.
- ✓ Anecdotal notes from lessons, student performance in games, and sticky notes.

REFLECTION

When reflecting on the activity, consider the following:

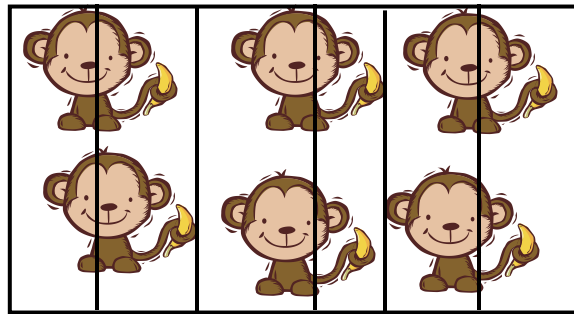
- ✓ Did students actively participate during the lesson? If not, what adjustments need to be made to allow all to actively participate?
- ✓ What was one thing new that I learned about my students today?
- ✓ What does the assessment data tell you about the design of the next lesson?

Adapted From: The Missing Monkey Mystery by Sarah Lauer and Colly Edwards

http://www.nsa.gov/academia/files/collected_learning/elementary/arithmetic/The_Missing_Monkey_Mystery.pdf

Name_____ Date_____

What If...?

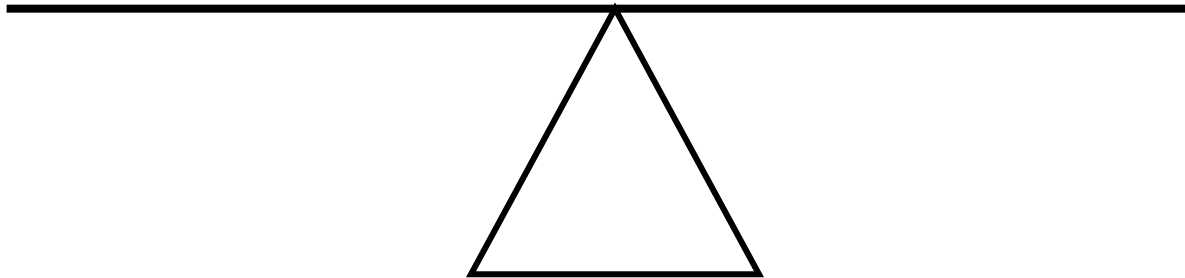
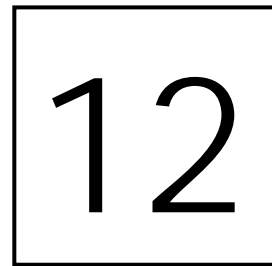
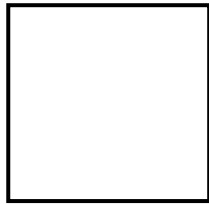
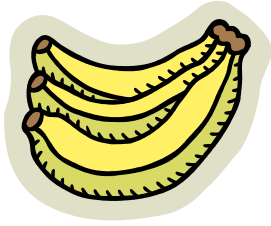


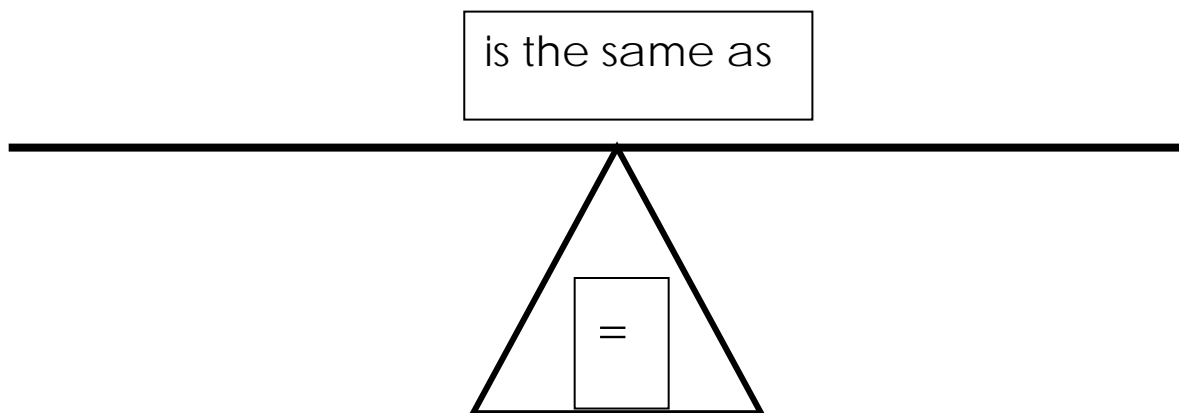
Imagine you are watching your assigned monkey cage and you notice that there are 6 monkeys. For each problem, answer the following question:

How many monkeys are missing?

What if there should be 10 monkeys in the cage? _____ monkeys	What if there should be 12 monkeys in the cage? _____ monkeys
What if there should be 15 monkeys in the cage? _____ monkeys	What if there should be 11 monkeys in the cage? _____ monkeys

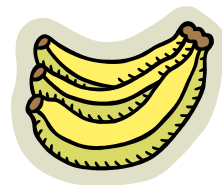
What's the Addend?





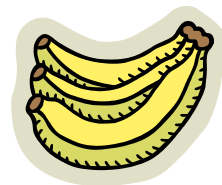
Number Sentence:

Balancing Bananas



1. Place the cards in separate piles by color, facedown.
 2. Partner #1 will take 1 card from each pile and flip them over. Place the cards on opposite sides of the balance.
 3. Partner #2 will count on from the given number of bananas up to the sum using counters
 4. Partner #1 will write a number sentence that represents what's happening on the balance (on sticky note)
 5. Switch roles and repeat steps 1-4
-

Balancing Bananas



1. Place the cards in separate piles by color, facedown.
2. Partner #1 will take 1 card from each pile and flip them over. Place the cards on opposite sides of the balance.
3. Partner #2 will count on from the given number of bananas up to the sum using counters.
4. Partner #1 will write a number sentence that represents what's happening on the balance (on sticky note).
5. Switch roles and repeat steps 1-4.

The Missing Monkey Mystery, Magic Monkey Machine

OVERVIEW

Summary of Activity: This lesson continues to introduce the concept of finding missing numbers in number sentences. This lesson introduces the equal sign as *the same as* and guides students to balance both sides of an equation. During this lesson, the students will help the monkey trainer feed the monkeys the same amount of bananas and increase their knowledge of finding the missing addend.

Common Core Learning Standards:

- ✓ 1.OA.1. Use addition and subtraction within 20 to solve word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using objects, drawings, and equations with a symbol for the unknown number to represent the problem.
- ✓ 1.OA.4. Understand subtraction as an unknown-addend problem.

Mathematical Practices:

- ✓ MP.1 Make sense of problems and persevere in solving them.
- ✓ MP.2 Reason abstractly and quantitatively.
- ✓ MP.4 Model with mathematics.
- ✓ MP.6 Attend to precision.

Essential Questions:

- ✓ How can I guide my students in discovering the missing addend in a real world situation?
- ✓ How can I facilitate students to use data in pictures to help find missing numbers in number sentences?
- ✓ How can I help students apply the strategy of counting on?

Vertical Alignment:

- ✓ K.OA.1. Represent addition and subtraction with objects, fingers, mental images, drawings, sounds (e.g., claps), acting out situations, verbal explanations, expressions, or equations.
- ✓ K.OA.2. Solve addition and subtraction word problems, and add and subtract within 10, e.g., by using objects or drawings to represent the problem.
- ✓ 2.OA.1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
- ✓ 2.OA.1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking

apart, and comparing, with unknowns in all positions, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.

MATERIALS AND RESOURCES

Instructional Materials: Magic Monkey Machine (hat, scarf, box, etc.), Student Resource 8 “Magic Monkey Machine” cards (copy, fold down center, laminate, and cut to make flash cards with answer on back – one per pair of students). Dry erase boards, markers, and erasers (tissues) – one each per student. Use Student Resource 9 “Missing Number Exploration.” Prepare a bag for each pair of students with Student Resources 10A and 10B (A in one color and B in another).

Lined chart paper, Student Resource 11 “Missing Numbers Masters” and Student Resource 12 “Missing Monkey Mystery Summative Assessment”.

IMPLEMENTATION

Procedure:

- ✓ (Engagement): Use the “Magic Monkey Machine” to scaffold students’ understanding from the concrete representation to the abstract (Student Resource 8). Tell students to come to the meeting area with their dry erase board, marker, and tissue. Show them the “Magic Monkey Machine.” This is where you will hide the Monkey Cards.
 - Show the front of the first card where the empty box is. Tell the class that you will put the Monkey Card into the “Magic Monkey Machine” and it will turn the card into a number sentence and will reveal the missing number! Tell students that they will need to think of the correct missing number and other ways to make the sum while the Magic Monkey Machine is working.
 - Do this with three other cards. Kids should be excited at this point!
- ✓ (Exploration): Tell students to find the missing numbers on the Student Resource 9 “Missing Number Exploration.” Tell students to work with a partner to fill in the missing numbers.
- ✓ (Explanation): Call the students to the meeting area. Have students turn and talk about the strategy they used to find the missing numbers. Confirm or clarify. Tell students that they will continue to use the count on strategy to find missing numbers.
 - ✓ Say to students: “Trixie needs your help again. The monkeys took and hid the deck of cards she was going to use for a trick and they mixed the cards up.” (Model how to play “Monkey Memory” using Student Resources 10A and 10B and the think-aloud strategy)
 - Say: “I have a card with the number sentence $15 = 3 + \quad$. I need to know the number that is missing from the box. I am going to use the count on strategy to solve the problem. So I start at 3 and count on to 15. 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15. I got it! I am holding up 8 fingers. The missing

number is 8 and now I have to look for a card with an 8 on it. Now it's my partner's turn.

- ✓ (Application) Have students play "Monkey Memory" with a partner.
 - Take anecdotal notes while observing how students apply their own problem-solving skills.
- ✓ (Assessment) Allow students to complete Student Resource 11 with a partner, counters, and whatever other tools they may need. Bring these to the group and share responses. Clarify any misunderstandings.

Differentiated Instruction:

- ✓ Adjust the numbers that you will be counting on to for each group of learners. Increase numbers so there is a struggle, but not a frustration.

UDL Supports:

- ✓ Means of Representation: Indicate the unknown with a different color to emphasize the missing number in the number sentence.
- ✓ Means of Action: Use a floor number line to assist students with the action of counting on.
- ✓ Means of Engagement: Pair students so those struggling with language are with those that can assist.

Assessment:

- ✓ Summative Assessment: Missing Monkey Mystery (Student Resource 12)
- ✓ Student Resource 11 responses and Missing Number Explorations

REFLECTION

When reflecting on the activity, consider the following:


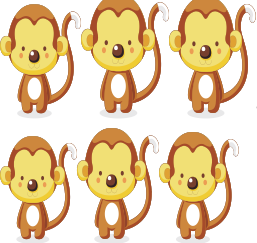
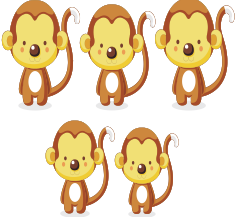
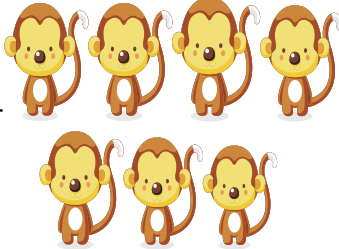
- ✓ Did I ensure that each student had the opportunity to make a meaningful contribution to the class discussion? If not, what adjustments need to be made to allow all to actively participate?
- ✓ What does the assessment data tell you about the design of the next lesson?

Adapted From: The Missing Monkey Mystery by Sarah Lauer and Colly Edwards

http://www.nsa.gov/academia/files/collected_learning/elementary/arithmetic/The_Missing_Monkey_Mystery.pdf

MAGIC MONKEY MACHINE CARDS

Directions: Fold and cut. Front is pictures and back is number sentences.

 + _____ = 7	4+3=7
 + _____ = 10	6+4=10
_____ +  = 12	7+5=12
_____ +  = 18	11+7=18

MISSING NUMBER EXPLORATION



$$1 + \underline{\hspace{2cm}} = 3$$

$$4 = 2 + \underline{\hspace{2cm}}$$

$$5 + 3 = \underline{\hspace{2cm}}$$

MISSING NUMBER EXPLORATION



$$1 + \underline{\hspace{2cm}} = 3$$

$$4 = 2 + \underline{\hspace{2cm}}$$

$$5+3=\underline{\hspace{2cm}}$$

Student Resource 10A

Monkey Memory Missing Numbers

8

12

1

9

2

15

5

10

Monkey Memory Number Sentences

$15 = 3 + \underline{\hspace{2cm}}$	$12 = 4 + \underline{\hspace{2cm}}$
$7 + \underline{\hspace{2cm}} = 16$	$9 + \underline{\hspace{2cm}} = 10$
$\underline{\hspace{2cm}} + 2 = 17$	$\underline{\hspace{2cm}} + 9 = 11$
$18 = \underline{\hspace{2cm}} + 8$	$13 = \underline{\hspace{2cm}} + 8$
$8 + \underline{\hspace{2cm}} = 19$	$7 + \underline{\hspace{2cm}} = 14$

MISSING NUMBER MASTERS

$$4 + \underline{\quad} = 10 + 6$$

$$\underline{\quad} + 7 = 9 + 9$$

$$1 + 3 = \underline{\quad} + 2$$

$$5 + 8 = 6 + \underline{\quad}$$

$$6 + \underline{\quad} = 9 + 8$$

The Missing Monkey Mystery

STEP A

Solve for the missing number.

$$\underline{\hspace{2cm}} + 9 = 14 + 4$$

STEP B

Use what you know about counting on to explain how you solved for the missing number. You may use words, pictures, numbers, and/or symbols in your explanation.



12 Cats and Dogs: How Many of Each?

OVERVIEW

Summary of Activity: Twelve Cats and Dogs: How Many Of Each? is a lesson where students find combinations of cats and dogs they could have so there are 12 animals in all, and they share their solutions.

Common Core Learning Standards:

1.OA.1. Use addition and subtraction within 20 to solve word problems.

Mathematical Practices:

MP1: Make sense of problems and persevere in solving them.

MP2: Reason abstractly and quantitatively.

MP3: Use appropriate tools strategically.

MP4: Attend to precision.

Essential Questions:

- ✓ How can we find combinations of 12 using pictures, stories, objects to model number combinations?
- ✓ How can we explore the relationship among numbers?
- ✓ How can we find more than one solution to a problem?

Vertical Alignment:

K.OA.2. Solve addition and subtraction word problems, and add and subtract within 10.

2.OA.1. Use addition and subtraction within 100 to solve one- and two-step word problems involving situations of adding to, taking from, putting together, taking apart, and comparing, with unknowns in all positions.

MATERIALS AND RESOURCES

Instructional Materials: Unlined paper, counters, or cubes

IMPLEMENTATION

- Procedure: Have a piece of chart paper and counters or cubes with two different colors at the meeting area.
- Start a discussion with students about how many pets they have at home.
- Explain that students will solve a problem about 12 pets.

- Present the problem: Suppose I have 12 pets at home, some are cats and some are dogs. How many of each could I have? How many cats? How many dogs?
- Remind students that they are 12 in all (write 12 in all at the top of the chart paper).
- Accept two different suggestions and have students model how they figured it out with counters or cubes.
- Distribute unlined paper and counters to students and have them work either individually or in pairs.
- Remind students to use counters or cubes to find a solution and record it on the paper.
- Encourage students to come up with as many solutions as they can.
- As students work individually or in groups, the teacher circulates to observe and assess students understanding of the task.
- After 15-20 minutes, bring students back and have them share their solutions while you record them on a chart.
- Encourage students to share the different strategies they used.

Differentiated Instruction:

For children who are having problem with combinations of 12, adjust the number of pets to 6 or 8. Students who understand the combination of 12 can use a higher number.

Students who can make all the possible combinations of 12 can write a written explanation how they know they found all the possible combinations.

- Students who have mastered the combinations of 12 can also find the combinations of 12 using three pets (cats, dog and fish).

UDL Supports:

- ✓ Means of Representation: for the linguistically diverse classroom, show students possible house hold pets. Sketch a house with a family beside it. Sketch a cat and a dog as well and explain that these are the family's pets.
- ✓ Means of Action and Expression: Twelve boys and girls may act out the problem.
- ✓ Means of Action: Students can be given two color counters to help them visually make combinations of 12.
- ✓ Means of Engagement: students can use how many pets they or family and friends have to help create their combinations.

Assessment:

As students are busy recording their combinations, the teacher can observe students mathematical thinking to assess:

- Student understanding of the task.
- How students are modeling the problem (e.g., use of counters, drawing, or mental)?
- Whether any students are having difficulty getting started (Suggest he/she begin by taking a few counters of one color and letting that color represent dogs. Then ask the student how they can find out how many cats there are if they are 12 pets in all.

- What strategies are students using? Are they using a two color counter. Are they randomly picking numbers? Are they using other strategies?
- Do students feel comfortable working with the number 12, or is the number 12 too large of a number for them?
- How do students record their solutions and check for accuracy?
- Do students notice any relationships among the combinations?

REFLECTION

When reflecting on the activity, consider the following:

- Did students come up with their own strategies for combining 12?
- Did students understand that there are different ways to solve the problem?
- How effectively were they using manipulatives to solve the problem?
- Do students have an organized way of keeping a record of their combinations?
- How can I help students to continue to understand the relationship among numbers when combining them in future lessons?

Activity Adapted from *TERC Building Number Sense* Grade 1

Beat the Clock!

OVERVIEW

Summary of Activity:

Students will work on this independently during Math Centers or Computer Time. The different games count up the minutes as the students work on building simple equations up to 10. If a question is answered wrong, the game offers an explanation.

Common Core Learning Standards:

1. OA.6. Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$); decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$); using the relationship between addition and subtraction.

Mathematical Practices:

MP.1 Make sense of problems and persevere in solving them.

MP.2 Reason abstractly and quantitatively.

MP.5 Use appropriate tools strategically.

MP.6 Attend to precision.

Essential Questions:

- ✓ Is there more than one way to show a number?
- ✓ Can you join parts to make a whole?

Vertical Alignment:

- ✓ K.OA.4. For any number from 1 to 9, find the number that makes 10 when added to the given number.
- ✓ 2.OA.2. Fluently add and subtract within 20.

MATERIALS AND RESOURCES

Instructional Materials: Computer and Access to the Internet

Resources:

- <http://www.ixl.com/math/grade-1/addition-ways-to-make-a-number>
- <http://www.ixl.com/math/grade-1/addition-word-problems-sums-to-10>
- <http://www.ixl.com/math/grade-1/word-problems-write-the-addition-sentence>

- <http://www.ixl.com/math/grade-1/complete-the-addition-sentence>
- www.watchknowlearn.org video “Mental Math Strategies Make a Ten Strategy”

IMPLEMENTATION

Procedure:

Students work independently at their computer stations to improve fluency.

Differentiated Instruction:

Students who have difficulty with the simple, beginning addition equations, such as adding 0, 1 and doubles, can work with a teacher led team on easier practice pages, such as:

<http://www.ixl.com/math/grade-1/adding-zero>

<http://www.ixl.com/math/grade-1/adding-doubles>

UDL Supports:

- ✓ Means of representation: Be alert to the size of images on the computer screen; check the “view” component for size.
- ✓ Means of Action: allow students to have handy access to manipulatives or paper as they view the problems on the computer screen.
- ✓ Means of Engagement: Allow students to work with a buddy, especially if computer assistance is needed. Some students may benefit from working with the teacher in a small group in front of the Smartboard.

Assessment:

Teacher will need to observe during activity and take notes for future planning. Teacher can also do a mental recall of facts to check for fluency.

REFLECTION

When reflecting on the activity, think about the following:

- ✓ Did I challenge all students to take risks?
- ✓ Which students had difficulty at the computer, not because of the mathematics but because of the unfamiliarity with using a computer?
- ✓ At the end of the activity, can students demonstrate fluency without the use of the computer? What follow-up needs to be implemented for those who cannot demonstrate fluency?

How Many Ways?

OVERVIEW

Summary of Activity:

Students use premade graphic organizers to practice all the different ways to make certain numbers. For instance, 2 Ways to Make 2, 3 Ways to Make 3, etc., up to 12 Ways to Make 12. Students will play this game as a reinforcing math center. The game can eventually be turned into a timed, low-pressure and fun competition to improve fluency.

Common Core Learning Standards:

1. OA.6. Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$); decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$); using the relationship between addition and subtraction.

Mathematical Practices:

MP.1 Make sense of problems and persevere in solving them.
MP.2 Reason abstractly and quantitatively.
MP.6 Attend to precision.
MP.7 Look for and make use of structure.

Essential Questions:

- ✓ Is there more than one way to show a number?
- ✓ Can you join parts to make a whole?

Vertical Alignment:

- ✓ K.OA.4. For any number from 1 to 9, find the number that makes 10 when added to the given number.
- ✓ 2.OA.2. Fluently add and subtract within 20

MATERIALS AND RESOURCES

Instructional Materials:

- graphic organizers
- counters
- counting bears
- connecting cubes
- dry erase board/markers
- pennies

IMPLEMENTATION

Procedure:

1. Teacher models on SmartBoard what is expected of each student.
2. Teacher breaks children into dyads. (2 child teams)
3. Teacher hands out appropriate graphic organizers and manipulatives.
4. Students work in their dyads while teacher walks around, checking on student work.

Differentiated Instruction:

The game can be differentiated to support low, middle and high performing students.

- The low group will work in a small group with the teacher's assistance, and using manipulatives, will work together to complete each graphic organizer. After working together, the students will be encouraged to try that same organizer on their own.
- The middle group will work in dyads up to 10 Ways to Make 10.
- High level students work independently to create up to 12 Ways to Make 12.

Students can record answers on a sheet. Depending on the group, the sheets will either be blank or contain a structured direction. Students should be encouraged to draw their different answers as they are finding them.

UDL Supports:

- ✓ Means of representation; Provides examples that address different senses and/or different interests for different types of learners (hands on manipulatives, connecting cubes to show the "connection" of addition, etc.)
- ✓ Means of Engagement: How can we use these arrangements with the students in our classroom? How can we use these arrangements when we line up for recess?

Assessment:

Children are assessed at the end of the assignment based on completion of assigned graphic organizer. For instance, if they were assigned 2 Ways to Make 2, there must be 2 equations represented, and so on.

REFLECTION

When reflecting on the activity, think about the following:

- ✓ When assessing today's activity, how will I use the data to plan accordingly for the next activity?
- ✓ Did I challenge all students, even those who worked with low numbers? Did all students experience a struggle in mathematics?

- ✓ Can students use more than one strategy, or are they relying on the same strategy each time?

Making Numbers

OVERVIEW

Common Core Learning Standards:

1. OA.6. Add and subtract within 20, demonstrating fluency for addition and subtraction within 10. Use strategies such as counting on; making ten (e.g., $8 + 6 = 8 + 2 + 4 = 10 + 4 = 14$); decomposing a number leading to a ten (e.g., $13 - 4 = 13 - 3 - 1 = 10 - 1 = 9$); using the relationship between addition and subtraction.

Mathematical Practices:

MP.1 Make sense of problems and persevere in solving them.
MP.2 Reason abstractly and quantitatively.
MP.6 Attend to precision.
MP.7 Look for and make use of structure.

Essential Questions:

- ✓ Is there more than one way to show a number?
- ✓ Can you join parts to make a whole?

Vertical Alignment:

- ✓ K.OA.4. For any number from 1 to 9, find the number that makes 10 when added to the given number.
- ✓ 2.OA.2. Fluently add and subtract within 20.

MATERIALS AND RESOURCES

Instructional Materials:

counters, connecting cubes, counting bears, pennies, and counting mat

IMPLEMENTATION

Procedure:

Teacher distributes 7, 8, or 9 manipulatives to the student, including but not limited to:

- counters
- connecting cubes

- counting bears
- pennies

They count to find the total number of manipulatives. Teacher asks, “How many counters did you count?” They then write the number on top of their work mat. The teacher then instructs, “Use the counters to show the parts of (7, 8, or 9).” After allowing them time to place their counters, children will share their results. Game can eventually be turned into a timed, low-pressure and fun competition to improve fluency.

Differentiated Instruction:

The game can be differentiated to support low, middle and high performing students. The low group will work in a small group with the teacher’s assistance, and using manipulatives, will work together to complete each graphic organizer. After working together, the students will be encouraged to try that same organizer on their own. The middle group can work in dyads and discuss their part/part/whole relationships, while high-level students work independently and record all of their answers as number sentences.

UDL Supports:

- ✓ Means of Action: Always be aware of fine motor development when deciding on manipulatives, you may need to vary the manipulative based on development of fine motor ability, especially when speed is part of the lesson.

Assessment:

Children are assessed at the end of the assignment based on completion of assigned work mat. For instance, if the whole of the work mat is 9, they must show the proper break down of parts.

REFLECTION

When reflecting on the activity, think about the following:

- ✓ Am I observing how my students work in mathematics, who is demonstrating perseverance, and who needs additional support in developing stamina?
- ✓ How did students demonstrate the understanding of the relationship between addition and subtraction?

Ten in the Bag

OVERVIEW

Summary of Activity:

Pairs of students receive clear bags filled with different numbers of items, such as counters, bears, crayons, connecting cubes, counting bears, etc. Each team is challenged to figure out how many more items are needed in order to have a total of ten in the bag. Students should collaborate to write number sentences (subtraction or missing addend) to represent their bag.

Common Core Learning Standards:

1. OA.4. Understand subtraction as an unknown-addend problem.

Mathematical Practices:

MP.1 Make sense of problems and persevere in solving them.

MP.2 Reason abstractly and quantitatively.

MP.6 Attend to precision.

MP.7 Look for and make use of structure.

Essential Questions:

- ✓ Is there more than one way to show a number?
- ✓ Can you join parts to make a whole?

Vertical Alignment:

- ✓ K.OA.4. For any number from 1 to 9, find the number that makes 10 when added to the given number, e.g., by using objects or drawings, and record the answer with a drawing or equation.
- ✓ 2. OA.4. Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

MATERIALS AND RESOURCES

Instructional Materials:

paper and pencil, bags of items, counters, bears, crayons, connecting cubes, and counting bears

Resources:

<http://www.brainpopjr.com/math/additionandsubtraction/makingten/grownups.weml>

IMPLEMENTATION

Procedure:

Pairs of students receive clear bags filled with different numbers of items, such as counters, bears, crayons, connecting cubes, counting bears, etc. Each team is challenged to figure out how many more items are needed in order to have a total of ten in the bag. Students should collaborate to write number sentences (subtraction or missing addend) to represent their bag.

Differentiated Instruction:

The game can be differentiated to support low-, middle-, and high-performing students. The low group will work in a small group with the teacher's assistance, while middle- and high-performing students work independently.

UDL Supports:

- ✓ Means of Action: In order to organize their facts, some students may benefit from using a template with ten spaces so they can arrange the items from their bag onto the spaces.

Assessment:

Teachers assess the students as they play the game by means of anecdotal observations and conferencing.

REFLECTION

When reflecting on the activity, think about the following:

- ✓ How did the students demonstrate an understanding of the standards present in this lesson?
- ✓ Did I set clear expectations so students knew what was expected of them? If not, how can I be more effective next time?

It is our hope that both you and your students gained knowledge throughout this unit. It was designed with the goal of achieving proficiency in the standards and practices embedded in this task.

We hope that you, the teacher, learned much about your students while administering this task and by observing how they learn when incorporating the learning activities. Performance can be improved when an investment in analyzing work samples and errors occurs. Once you feel confident in identifying errors and learning styles, you will be able to plan accordingly.

